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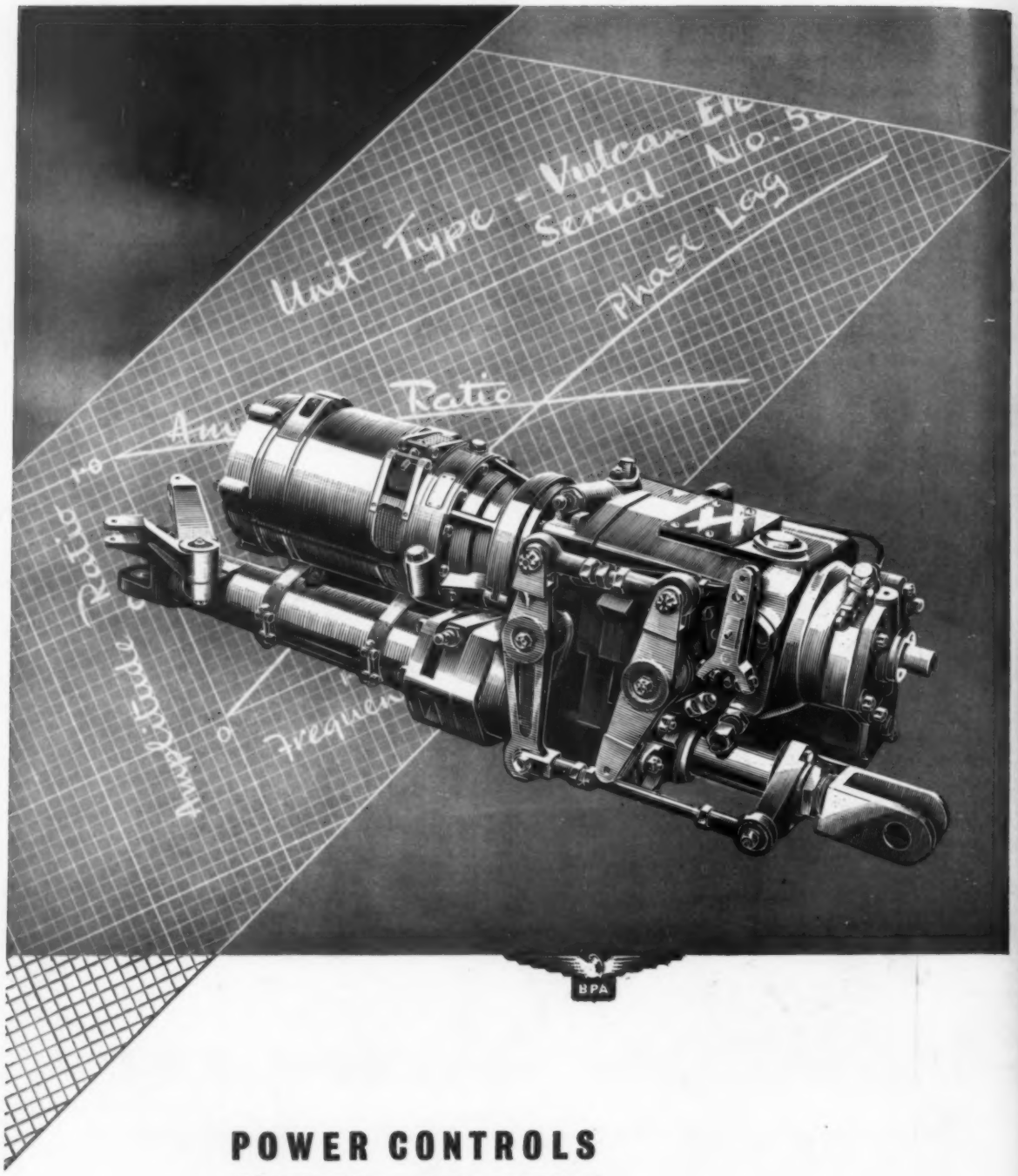

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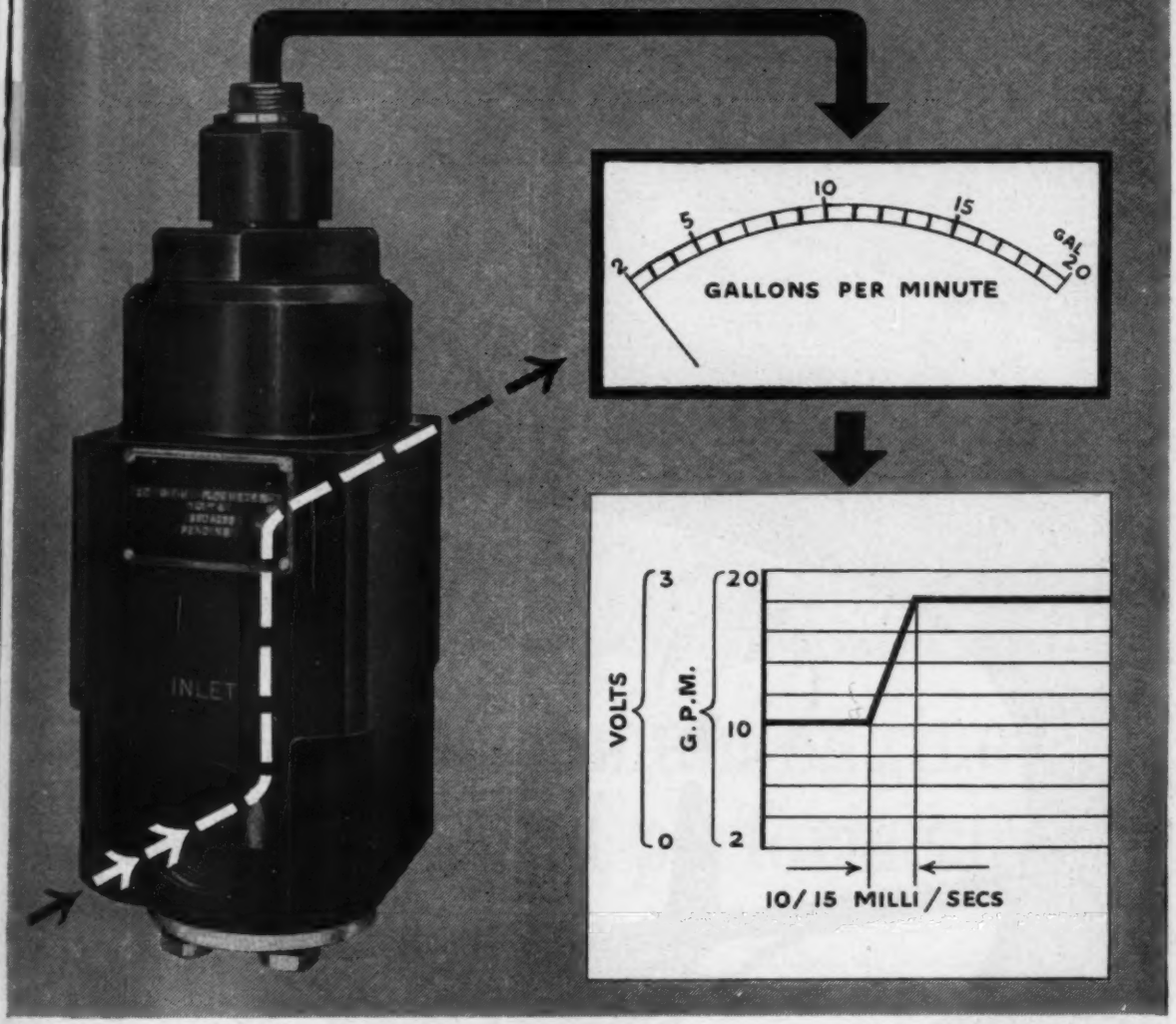

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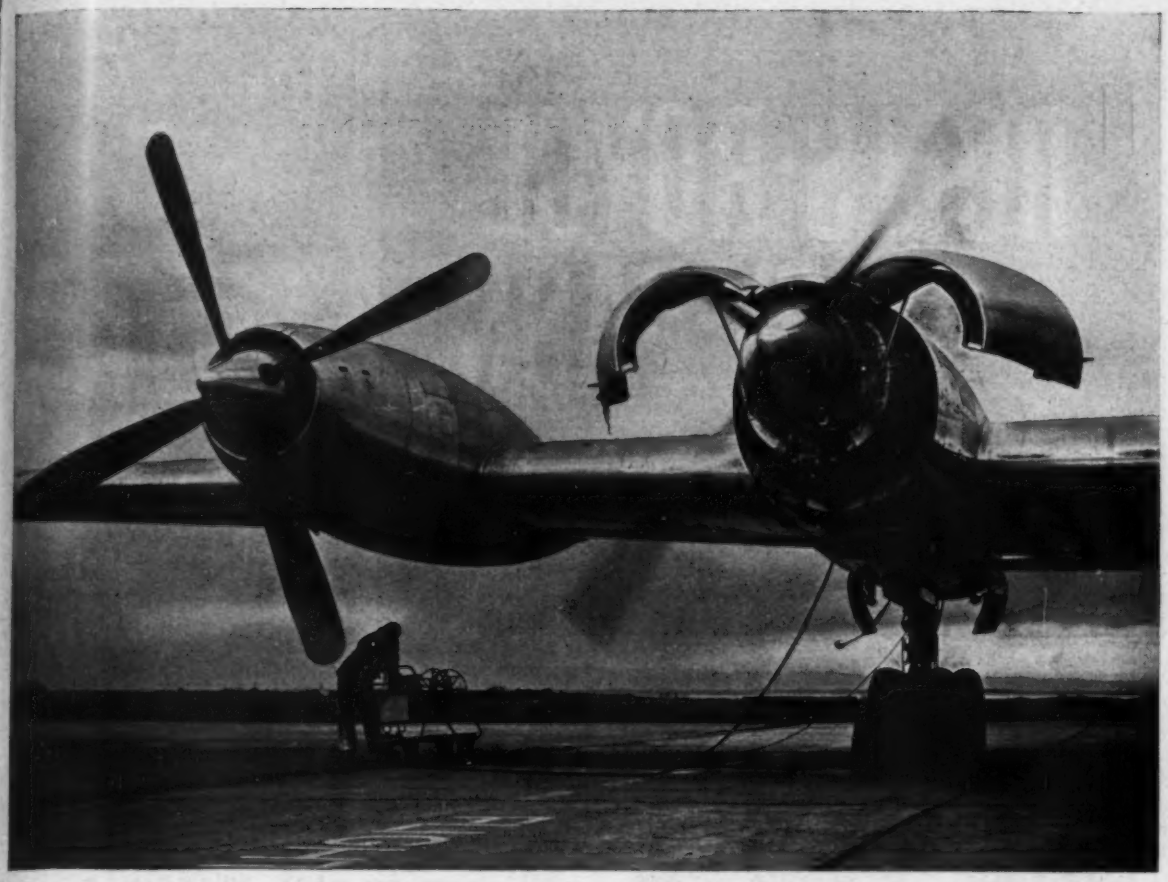

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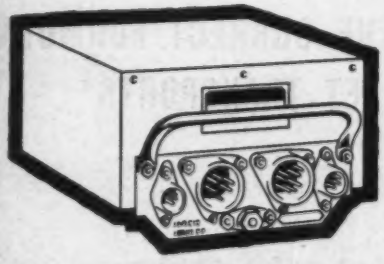

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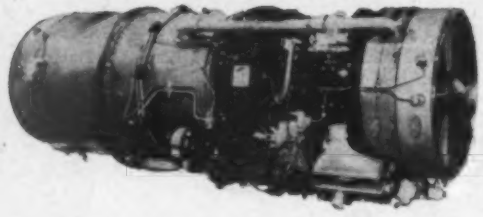

Conway by-pass jets will enter service this year in Boeing 707-420 and Douglas DC.8 jet airliners at 17,500 lb. guaranteed minimum thrust. The Civil Conway is being developed to powers over 20,000 lb. thrust with improved fuel consumption and will power the Vickers VC.10.

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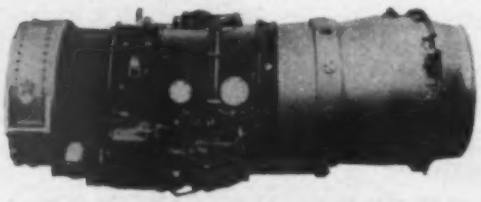
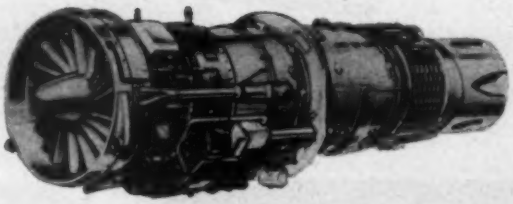


The RB. 141 of 15,000 lb. guaranteed minimum thrust will power later versions of the Sud Aviation Caravelle.



The RB. 163 of 9,850 lb. guaranteed minimum thrust has been chosen to power the Airco DH.121.

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No 2664 VOLUME 77 FRIDAY 1 APRIL 1960

FLIGHT

AIRCRAFT, SPACECRAFT, MISSILES

Official Organ of the Royal Aero Club First Aeronautical Weekly in the World Founded 1909

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MAURICE A. SMITH DFC

Editor
H. F. KING MBE

Technical Editor
W. T. GUNSTON

Production Editor
ROY CASEY

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Fair Stands the Wind for France . . .

RECOMMENDED reading this weekend for our Minister of Aviation and for the heads of the new industrial complexes his policies have created is a news-item overleaf entitled "French Industry Moves Into Australia." This title is not far short of a literal truth (would that it were otherwise).

Among the weightier implications of the news is one which, now apparent as a warning, may be viewed in the months ahead as a sharp reproach. We have in mind Australia's reported commercial and governmental interest in the Max Holste Super Broussard—and we might add that a New Zealand airline is showing no less an interest. The Super Broussard is not just another "DC-3 replacement." It is a DC-3 replacement with exceptional take-off and landing qualities and, as such, unique. When *Flight's* representative flew the prototype and recorded his impressions in our issue of November 13 last he reported that he asked M Holste about the Super Broussard's rivals; the reply was that it had none. That was one of the reasons, the French constructor declared, why the French government had decided to give it full support. Both the Twin Pioneer and Caribou were more specialized designs (the same would be true of France's STOL Bréguet 941), while the Avro 748, Friendship and Dart Herald came into the "proper airliner" class.

Meanwhile, in the "proper airliner" class it is clearly evident that the Sud Caravelle continues to be of interest to Australian operators, especially in its developed forms; and at the other end of the line the appealing little Rallye is seen in Australia as a possible Tiger Moth replacement.

Between them, then, French constructors are setting about the wrapping-up of a sizeable parcel of Australia's aircraft requirements; and a very neat job they promise to make of it.

. . . from the Antipodes

Other recommended reading in this issue (page 438) also relates to Australia. This special contribution forcefully draws attention to further threatened infiltration—it could even be inundation—of the military market in face of the strongest competition that America and Great Britain can muster.

No longer, in the absence of acceptable British military aircraft, will America's adroit, informed and influential salesmen be virtually assured of business. France is getting in on the deal, and will, we predict, be getting in even more deeply. This state of affairs, so evident from our news, can be attributed not only to the peculiar merits of certain types of French aircraft but to the resolute sales policy of France's industry, for some of the principal types of French aircraft have been demonstrated in Australia over a period of several years.

Our special correspondent concludes his survey by affirming that the RAAF is not anti-British, as some newspapers would have us in Britain believe. It simply wants, he says, the most suitable aircraft in regard to its economic position and its operational requirements; and he remarks that a short reading of history and geography will demonstrate that these cannot be identical with those of the RAF. It is our belief that Australia's commercial operators are not, by inclination, more anti-British than are their brothers in arms; but, as we have shown, Australian interest in France's newest civil aeroplanes is running high.

Certainly it must be recognized that a nation that can sell jet airliners to America (even to Douglas), as France has succeeded in doing, can sell other kinds of aeroplanes to other countries—of which Australia is by no means the least.

ROYAL TOUR: During an oilfield tour in Southern Persia last month the Shah flew in a Westland Whirlwind to visit an offshore drilling rig belonging to the Iran-Pan American International Oil Co. His pilot was K. W. Bradley (chief pilot of Bristow Helicopters, which company is now part of the Airwork Group)

FROM ALL QUARTERS

Bristol Board Changes

LAST Monday Bristol Aircraft Ltd announced details of board and executive changes preparatory to the company's forthcoming transfer to the British Aircraft Corporation Ltd. The details are as follows:—

Rear Admiral Sir Matthew Slattery and P. G. Masefield have resigned from the board and have relinquished their appointments as chairman and managing director respectively. Sir Matthew remains a director of the Bristol Aeroplane Co, which retains its holding in Short Brothers & Harland, of which he is chairman and managing director.

Sir Reginald Verdon Smith has been appointed chairman of Bristol Aircraft.

Dr A. E. Russell, hitherto chief engineer of that company, has been appointed technical director. He has retired from the Bristol Aeroplane Company's board in order to concentrate exclusively on the affairs of Bristol Aircraft.

J. F. Harper, formerly assistant managing director of Bristol Aircraft, has been appointed director and general manager. D. J. Farrar, hitherto chief designer (guided weapons), has been appointed chief engineer (guided weapons); Dr W. J. Strang, chief designer (fixed-wing aircraft) becomes chief engineer (aircraft). Mr Farrar and Dr Strang have been appointed to the board of Bristol aircraft. H. Giddings, assistant chief engineer, has been appointed chief development engineer.

As a result of these changes the board of Bristol Aircraft Ltd will now be constituted as follows: Sir Reginald Verdon Smith, chairman; C. F. Uwins; J. F. Harper, general manager; Dr A. E. Russell, technical director; R. S. Brown, works director; W. R. Farnes, sales director; G. E. Knight, commercial director; T. B. Pritchard, financial director and secretary; D. J. Farrar, chief engineer (guided weapons); and Dr W. J. Strang, chief engineer (aircraft).

British Aircraft Corporation is the title chosen for the holding company for the English Electric, Bristol and Vickers-Armstrongs aviation interests (*Flight*, March 11). There was speculation last weekend as to what new sphere of activity Mr Masefield will now choose. No announcement had been made at the time of our going to press, but it is perhaps pertinent that two posts for men with his qualifications will presently be available—the chairmanships of BOAC and the new Air Transport Licensing Board.

TSR.2 or TS.2?

UNOFFICIAL reports have appeared to the effect that the Vickers/English Electric TSR.2 is to become a one-mission aeroplane. It is alleged that it will not now be required to fulfil the reconnaissance role and instead will be employed by the RAF exclusively for strike purposes. If this is indeed the case the reason might be political and not owing to inability to find room for reconnaissance equipment. (Strike and reconnaissance are two of the roles which will be accomplished by the very much smaller Lockheed F-104G, and with packaged equipment conversion to either role should be possible in a matter of minutes).

French Industry Moves into Australia

OFEMA—Office Français d'Exportation de Matériel Aéronautique—has appointed V. F. Letcher, former Director of Aircraft Production in the Australian Department of Supply, as its Australian representative for all French aircraft except the Caravelle. Mr Letcher has formed a limited company, French Aeronautics Pty Ltd.

This is the first move in a determined effort by the French industry to secure business in Australia. The failure to sell two Caravelles to TAA in 1958 drew attention to the fact that no representative of the French industry was there during the period when official discussions on future equipment of Australian airlines were in progress. The American industry, particularly Lockheed, had a strong team in Canberra and Melbourne.

Arousing interest in Australia at the moment is the Max Holste Super-Broussard, which has impressed Ansett-ANA as a DC-3 replacement: the airline has an unpaid option on six of the first off the line. The Western Australian operators, MacRobertson-Miller Airlines, are also interested in Broussards to replace their DC-3s and form a turboprop team with their single Friendship. The Department of Civil Aviation, too, is planning to order one. Chief virtues of the Super-Broussard in Australia are the guaranteed price of £A100,000 and the very robust workmanship.

Australian clubs in search of a Tiger Moth replacement are reported to be considering the Morane-Saulnier Rallye, which it is understood would sell at about £A2,500. By DCA order Tiger Moths must be radio-equipped next year, and most operators and clubs regard the cost (a minimum of £150) as too great.

The Caravelle, which is now represented by Brown and Dureau of Melbourne, the Douglas agents, still interests Australian operators in the Mk 3 developed version for 1964-65. The D.H.121 will need to hurry to catch this interest.

New Zealand, too, is showing signs of a French invasion: there the Super-Broussard is said to be interesting the National Airways Corporation.

Fokker and Republic

CONTINUING the infiltration of the American aircraft industry into Europe, Republic Aviation have signed a production and development agreement with the Royal Netherlands Aircraft Factories, Fokker. The American company are to acquire one million florins' worth (nominal) of new Fokker ordinary shares for Fls.3,105,000 (£2.92m). Fokker's present share capital is a nominal Fls.2,675,000. Republic will also have two members on the Fokker board.

The agreement is stated to give Republic a more efficient outlet in Europe, and to make possible improved servicing and repair for the various types of F-105 and F-84 in USAF and NATO service. The Dutch company will "share the advantages of Republic's wide experience in building and developing supersonic aircraft and . . . VTOL aircraft."

TALKING GAZELLE? A party from Vertol Aircraft Corporation (now Vertol Division of Boeing) recently visited the Acton works of D. Napier & Son. Left to right are M. Lowe of Napier, Lee Douglas (Vertol vice-president, engineering), Don Berlin (Vertol president and chairman), and Sir Archibald Hope, B. T. Bayne and H. Sammons of Napier. Among other recent visitors to Napier have been representatives of the Japan Air Lines and New York Airways

NOT-SO-RELUCTANT DRAGON: A Saab J35A Draken (Dragon) of the Swedish Air Force, armed with Sidewinder missiles, scrambles during a recent major exercise. The Draken's powerplant is an advanced Avon with reheat. Swedish designation of the Sidewinder is Rb324

USAF ASR Re-organization

UNDER changes being introduced in the USAF air-sea rescue organization operating from Prestwick, the use of helicopters is being discontinued and Douglas SC-54 Rescuemasters introduced. These aircraft will work with the SA-16 Albatross amphibians already employed. The area covered from Prestwick by these aircraft, forming Detachment 1 of the 57th Air Rescue Sqn (with headquarters in the Azores) is being extended to include France, Spain and Greenland.

ASV.11 Jet Provost

HUNTING AIRCRAFT have released a detailed summary of the performance of the Jet Provost powered by the Bristol Siddeley Viper ASV.11, rated at 2,500lb—an increase of 750lb over the engine of the RAF T.3 aircraft. The following figures apply to the aircraft in ISA conditions, with the tip tanks attached and filled (dimensions—and appearance—are similar to those of the T.3):—

Gross weight, 7,230lb; take-off distance, 1,280ft ground run or 2,150ft to 50ft; landing distance, 2,560ft from 50ft or 1,590ft ground run; initial rate of climb, 3,340ft/min; time to height, 3.75min to 10,000ft, 7.25 to 20,000, 16 to 30,000; level speed, 330kt at sea level, 342 at 10,000ft, 351 at 20,000, 355 at 30,000; range 520 n.m. at 20,000ft, 600 at 30,000; endurance 2.42hr at circuit height, 3.03 at 25,000ft.

IN BRIEF

It is now permissible to disclose that the Bristol Siddeley Thor BT.1 ramjet has a thrust of 5,275lb at M2 at sea level. A much later version of the Thor is used in the Bloodhound guided weapon.

Westinghouse Electric Corp have finally withdrawn from the aero-engine field. The J34 (described in our world engine review on March 18) contracts will terminate in the summer of this year.

Investigating high-speed machining techniques, Lockheed Aircraft have employed a 20mm gun and a rocket sled. Using the sled, 4ft cuts have been made at 1,080ft/sec (about the speed of sound), but for minimum tool wear on a common hardened steel the best machining speed proved to be 120,000ft/min (nearly M2).

All-India radio recently reported that Hindustan Aircraft at Bangalore are making satisfactory progress on the HF.24 (supersonic fighter powered by Bristol Siddeley Orpheus BOr.12SR), a "logistic air-support aircraft" (scheduled to fly this year) and the series-production of Folland Gnats.

Nord-Aviation have signed an agreement with Bell Aircraft giving the American company an option for US manufacturing rights of the CT-20 and CT-41 targets (the CT-41 is the subject of a similar licence with Hawker Siddeley Aviation). Bell also secure information on the French company's ramjets and high-speed flight development.

Two Westland Wessex helicopters, for anti-submarine duties, are being handed over to the Royal Navy at Yeovil today. They are to form the initial equipment for 700H Flight and were being received from E. C. Wheeldon, Westland managing director, by the commanding officer, Lt Cdr R. J. Turpin. The Wessex, which carries equipment for the detection and destruction of submarines, was the first turbine-powered (Napier Gazelle) helicopter to be ordered in quantity for any of the British armed forces.

Negotiations with the German Defence Ministry are reported to involve spares for Fairey Gannets (some £219,000) and spares and overhauls for Bristol Siddeley Double Mamba engines (£500,000).

Two of our associate journals are publishing special issues next week, *The Motor Cycle* a Holiday Number (April 7) and *The Autocar* on Sports and Racing Cars (April 8).

Douglas (Long Beach) delivered the first C-133B to the US Air Force on March 21; it was flown to 1501st Air Transport Wing of MATS at Travis AFB. In 12 months' time it will have been joined at Travis by 14 additional Bs, bringing the USAF C-133 fleet up to its planned strength of 49 aircraft.

Eugene W. Murphy has been appointed assistant director of European operations and chief of public relations for Europe for Republic Aviation Corp. Mr Murphy, who served in the RAF and the USAF until 1952, has for the past eight years been employed by Carl Byoir and Associates as European representative.

Late last month Martin announced that the PM-1 reactor had started zero-power testing, which will continue for some 170 days. PM-1 is a portable power reactor for remote USAF bases. Water-moderated, it is designed to give 1,000kW of electrical power plus heat for buildings. The first will be installed next year at Sundance AFB, Wyoming.

An air-to-air study of a Hunter by Russell Adams, chief photographer of Gloster Aircraft, has been included in the Encyclopædia Britannica publication *Press Pictures of a Decade*. The Hunter, the second F.1 prototype, was being flown by Sqn Ldr Neville Duke and is depicted going up into a loop. The photograph and its companion pictures were published in *Flight* for November 14, 1952.

"FLIGHT" INDEX

THE index to Vol. 76 (July-December, 1959) of *Flight* is now available, price 1s (by post 1s 3d), from Iliffe & Sons Ltd, Dorset House, Stamford Street, London SE1. Readers' own copies of this volume can be bound (with index) at a cost of 25s, return postage included; or binding case and index are available separately, price 7s 6d (by post 9s). Copies for binding (with sender's name and address enclosed) should be forwarded to Iliffe & Sons Ltd, Binding Dept, 4/4a Iliffe Yard, London SE17, and advice and remittance sent separately to the publishing department at Dorset House.

ROTORCRAFT AND PARACHUTING were represented at the Royal Aero Club on March 23, when Lord Brabazon presented the Geoffrey de Havilland Trophy to Sqn Ldr W. R. Gellatly (left) and the Club's Silver Medal to Maj T. W. Willans. The occasion is reported on page 450

EXERCISE STARLIGHT

AN EXPERIMENT IN AIR MAINTENANCE

"Flight" Story and Pictures by John Yoxall

"THE barrenness of its scenery has been drawn by skilful pen and pencil. Its ample deserts have tasted the blood of brave men. It is the scene of war." These words, from the introductory chapter of Sir Winston Churchill's *The River War* — his account, written in the last century, of the reconquest of the Sudan—apply equally to the area in Libya over which Exercise Starlight was recently held.

But there the similarity ends. Sir Winston's story was one of continuous struggle against what is now known as logistics, whereas Exercise Starlight is a tale of troops quickly moved and amply maintained by the Royal Air Force while "fighting" over North African battlefields disputed some 16 years ago between the Eighth Army and the Africa Korps. It is stressed that the exercise was essentially an experiment in air maintenance—not practice of an established procedure—with the ultimate object of producing a quick-moving, highly effective "fire brigade" which could be rapidly transported to any trouble area.

The map on this page indicates the main outlines of the scheme. El Adem could be considered as the centre of the strategic reserve, and it was to here that Transport Command Britannias, Hastings and Comets brought the 1st Guards Brigade from Britain. To lend an air of reality to the exercise it was assumed that the ground between El Adem and Tmimi, the forward supply base, was impassable to all forms of ground transport.

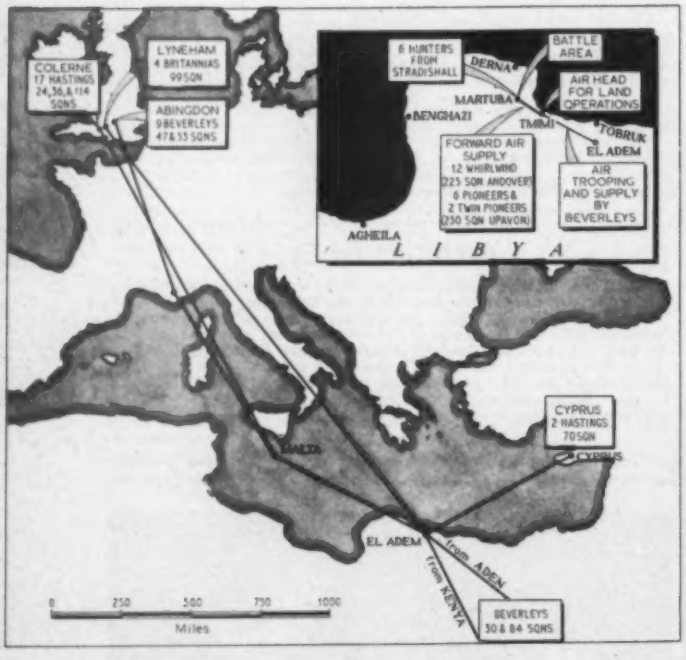
At El Adem the newly formed No 38 Group, under AVM P. G. Wykeham, took over, moving men, machines and materials up to Tmimi in its Beverleys. From Tmimi the supply fanned out to reach the troops in the field; helicopter and STOL aircraft flying almost continuously on this task and Beverleys making supply-drops in the later stages, when the battle had moved away, beyond the economical distance for using small aircraft, about 60-70 miles. Detailed figures of these operations are impressive:—

Phase 1, D-38 to D-day. Build-up at El Adem. Ten Britannia sorties for No 1 Rear Airfield Supply Organization, including No 47 Coy RASC; Royal Corps of Signals; heavy drop parachutes and equipment; RAF medical and provost supplies; elements of No 38 Group; and ground crews of No 225 and 230 Sqns and the tactical Beverleys.

Twenty-three Hastings sorties, taking 40 Land-Rover trailer combinations and drivers and six RAF Land-Rovers with trailers and drivers.

Sixteen Beverley sorties carrying 12 Whirlwinds of 225 Sqn, with passengers in tail-boom; two Alouettes of AAC with passengers in boom; vehicles of No 1 RASO and Royal Corps of Signals and equip-

In the heading picture: AVM P. G. Wykeham, who directed the air side of "Starlight," seen at Tmimi HQ with Wg Cdr W. Harris, Wg Cdr Operations, No 38 Group. The map, below, illustrates the build-up for the exercise. The strategic reserve was centred on El Adem



Supply train: Blackburn Beverleys at El Adem with some of their pallet-mounted parachuting loads. In the smaller pictures are seen an Auster being camouflaged immediately after landing; and one of the new Harley mobile floodlights, which assisted night maintenance work

Followed by a sandstorm of its own making, a Beverley taxies-in at Tmimi. Below, four Scottish Aviation Pioneers at various stages of landing, unloading and take-off at the 310yd Angel strip. Bottom, a Westland Whirlwind picks up a load; the handlers wear dust-masks

ment with passengers in boom; RAF Task Force personnel and equipment.

Phase 2, D-day to D+10. Strategic airlift of main force from UK to El Adem. Twenty-nine Britannia sorties carrying 3,190 men, each with 80lb of kit. Thirty-six Hastings sorties for 72 Army Land-Rover trailer combinations and drivers. Seven Beverley sorties for special loads.

Totals included 4,061 men, 115 vehicles with loads, 21 special vehicles, two helicopters and 50 tons of freight.

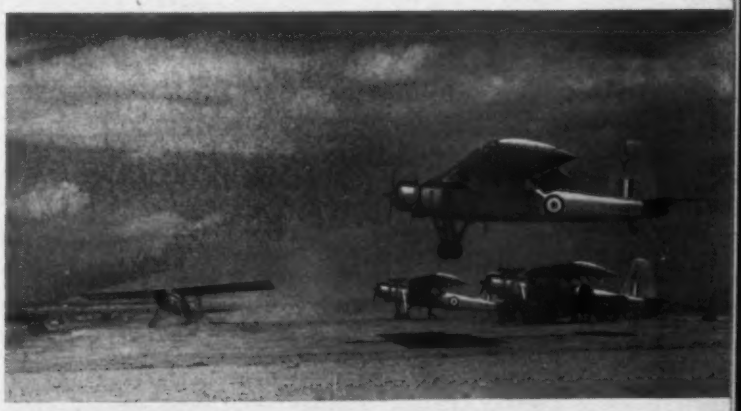
Movement of personnel, stores and equipment from El Adem up to Tmimi was made exclusively by 12 Beverleys, which operated with an 87 per cent serviceability rate. By D+9 they had transported, in 194 sorties under appalling conditions of sandstorm and rutted airstrip, 3,329 Army and 272 RAF personnel, 370 vehicles, 272 trailers, 40 guns and 1,546,559lb of freight.

On a seven-day maintenance basis, plus three days' reserve, the task was to move 1,425 tons from El Adem to Tmimi, where 697 tons stayed (375 tons reserve, 161 tons of fuel for the Pioneers and Whirlwinds and 161 tons of stores for local issue). This left 728 tons to be moved to the forward troops.

The load capabilities of the various aircraft employed were: Twin Pioneer, 2,400lb; Pioneer, 1,000lb; Whirlwind, 1,000lb; Beverley, 12 one-ton containers; Hastings, 28 panniers of 350lb each. At the strategic base, El Adem, the loads were carefully packed on pallets (each carrying two 1,000lb loads) in order that they could be handled by Massey-Ferguson farm tractors adapted as fork-lift vehicles. At Tmimi, the tactical base, the Westland Whirlwinds could pick up one of these 1,000lb loads on its pallet and deliver it direct to the forward troops. The Pioneers had, of course, to be loaded in the ordinary manner.

For the Beverleys to drop supplies in the forward areas a new 2,000lb container, a skeleton of nylon webbing, has been developed. Sandbags filled with straw were used as shock-dampers, but it is expected that paperboard honeycomb will ultimately provide better shock-insulation for such purposes. A typical load was 33 Jerricans, filled with water. The parachute canopy used is of 42ft diameter, weighing 90lb and valued at £300.

So much for the logistics. Now let us consider the battle. An imaginary country, Deleria, friendly but defenceless, is threatened by its neighbour Taffiya, which is aggressive and has some first-class equipment, but only second-rate ability to use it. Because of the need to bring all arms and supplies by air, the Delerians (1st Guards Brigade and ancillary units) were all on light scale; many of the vehicles were Land-Rovers, and their guns were towed by three-ton lorries. Offensive aircraft comprised six Hunters on a "cab rank," aided for two days by four Naval aircraft flown off the carrier HMS *Albion*. There was no Naval content at Joint HQ, the carrier's fighters being picked up and directed by the forward controllers. Taffiya's sole offensive aircraft was one Chipmunk. For reconnaissance Deleria had the Austers of No 8 Independent Reconnaissance Flight, AAC.



An AAC Auster leaves Tmimi for Control HQ at Derna

One Man's Starlight

LYNEHAM lay quiet, the Comets, Hastings and Britannias gleaming in the soft radiance of the apron lights; but presently a hundred-plus troops and newspapermen climbed aboard a Britannia of No 99 Sqn with Flt Lt Cotton as captain. Our flight-plan allowed for a direct run to El Adem in 5hr 18min, at 28,000ft and 350 m.p.h. groundspeed. This is trooping de luxe, and one wonders what Kitchener's soldiers would have thought of this modern magic; for them Africa was a month's journey.

How casually we now fly over other countries! Before the war it was a diplomatic victory to get permission for such a flight. Despite our height the cabin becomes overheated. A passenger asks the quartermaster if he will "get the stoker to push the damper in"; but no relief comes until the engines are throttled for the long let-down to El Adem in the cold light of dawn. Watches are put on from 0430 to 0630 and the next day has started. Promptly there is briefing by both the Army and the RAF, and in pouring rain (where is the wonderful African sun? It is colder here than in Britain) we are shown the palletted loads ready for transport to the airhead at Tmimi by Beverley and from there onward by Pioneer, Twin Pioneer, or Whirlwind. The ammunition boxes are filled with stones to the appropriate weight. A 90ft bridge, so designed that no single part is too heavy or cumbersome to be carried by a Whirlwind, is being loaded on to a lorry.

A quick lunch in the efficient transit mess at El Adem is followed by a climb up to the boom seats of a Beverley to fly to Tmimi. The airhead, reached after a short flight over almost featureless desert, has had less rain than El Adem but has profited by the little it had. The strip had become very dusty and developed ten-inch ruts.

The body starts to protest against continual travel and lack of sleep; but there is another 60 miles yet to do, huddled up and very cold in a Land-Rover, to the Jebel Akhdar hotel in Derna. The bath has no plug, the tap gives no water; off comes one's jacket to hang on a hook, and the whole row of hooks falls to the ground. Dinner is postponed so that we can visit the Control HQ on the old Derna airfield to enjoy the Army's hospitality. It has been raining again, and the whole area is a quagmire of red clay with the consistency of Plasticine.

Next morning, back to the mud of Derna for a general briefing on the rules of the battle, then into a Land-Rover for the 60 miles to Tmimi to watch the airhead in action: the blossoming, one might term it, of a stem which extends back through El Adem to Britain.

Beverleys, under the command of Wg Cdr Rawlins, OC flying at Abingdon, come into the sandy, rutted strip, using only reverse pitch for stopping, wet sand at El Adem and dust storms at Tmimi having taken toll of brake mechanisms. An atmosphere of purposeful hurry pervades the airfield; frequently one Beverley may be seen rolling out of a self-made sandstorm, impatient of another still taxying in. Unloaded stores are parked in carefully organized areas to simplify the task of selection for lifting to forward battle areas. Whirlwinds queue up literally within a few yards of one another to pick up their loads.

On the Pioneer strip the same sense of terrific urgency is apparent. The sight of aircraft taxying at high speed in opposite directions on the strip would give the average airfield control officer sleepless nights for a month. The troops loading and unloading the aircraft are magnificent to watch, so efficient are they.

Next day I was generously offered a seat in a jeep by a group of Esso geologists who were searching for oil in Libya. They dropped me at the HQ of the 8th Independent Reconnaissance Flight Army Air Corps. To attend Starlight, the 8th IRF had travelled from Idris, stopping at Sirte, Marble Arch and Benghazi, and leap-frogging with their ground transport. The unit comprised six Austers—four Mk 6 and two Mk 7—and one Chipmunk. Two Austers were being used for communications, and in one of these Capt Williams flew me to the forward airstrip near Tmimi.

Here Capt Adams became host and we at once departed by air to see if a new airstrip, "Angel," farther forward, was ready for use. Getting an affirmative, we returned to the original airstrip and Adams instructed the section to move up. Ours was the first aircraft to land at the new strip, which was 310yd long and had taken the REs a matter of seven hours to make.

A quick lunch of tinned salmon spread thickly on "thirty-five holers"—army biscuits—and we were off on a reconnaissance of the Martuba battle area. But let my notebook tell the story:—

Leave Angel as dust kicked up by Pioneer blows away. Whirlwind lands alongside as we take off. Height about 150ft to keep below the hills, out of sight of enemy's eyes and radar. Instructions to get information on forward positions of the Taffiyans. Below, tiny sparse cornfields which the army mustn't damage in any way; disreputable little Arab hutments; a "blown" bridge with mine-free path shown by tapes. Pilot busy flying Auster, map reading, missing hills, looking for enemy.

Brief climbs to 800ft for spotting. Pinpoint two enemy armoured cars and troops in small strength, and radio map reference to HQ. Now airborne for 50min, so to avoid enemy reaction must return to Angel. Concealed approach, but our dust would have given away position of airstrip. Because of dust overshoot twice. Auster under camouflage netting within two minutes.

* * *

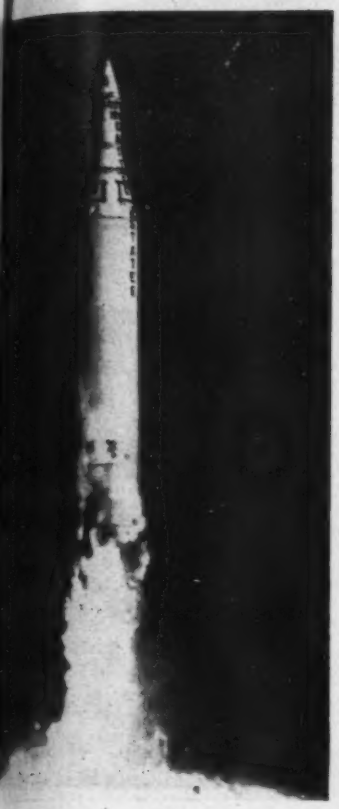
This is a wonderful life for anyone who likes low flying. For me it recalled flying in R.E.8s 43 years ago at the Artillery Observation School at the then new airfield of Almaza, Cairo. The difference? The R.E.8 had open cockpits, that's all.

I got no flying on my last day with the exercise, but spent most of it waiting for the Guards to capture Martuba. In the best Hendon RAF Display style the sappers had contrived nearly a hundred "effects" and had devised a mortar to throw thunderflashes into the air. There was the village complete with date palms and two Hunters ground-strafing; a general arrived by Alouette. All was ready for the set-piece but, unfortunately, the battle was late and I had to make a quick dash to catch the troopship *Dilwara* for an overnight passage to Tobruk and thence back to El Adem.

Before going aboard the 216 Sqn Comet *Orion* (captain, Flt Lt Somers) for an uneventful flight to London at half the speed of the rotation of the Earth, the last figures that went into my notebook were "12 Beverleys shifted 2,200,000lb of freight; 11 still serviceable."

Hurry, hurry. A Twin Pioneer takes off from the Angel strip as a Whirlwind hovers to unload

Missiles and Spaceflight



The attempted launching of a 35.3lb satellite, Explorer 8, from Cape Canaveral on March 23 was unsuccessful. The first stage of the four-stage Juno 2 launching vehicle (left) fired as planned, but soon after first-stage burn-out radio contact was lost and it was believed that one of the upper stages failed to ignite. The satellite was intended to provide information on the Van Allen radiation belts

AEOLUS SUCCESS

A height of 80 miles was achieved in a successful night firing of an Australian two-stage, solid-propellant Aeolus rocket from Woomera on March 24. The object of the launching was to prove the performance of ground instrumentation systems recently installed at Woomera, including phototheodolites which photograph flashes emitted by the rocket against a star background. Among the observers present on March 24 was Alan S. Hulme, the Australian Minister for Supply, who said that Aeolus could be used in connection with the forthcoming Australian space-research programme. Mr Hulme was later reported to have said that everything was going according to plan at Lake Hart, where Blue Streak launching platforms were being erected.

POLARIS PROGRESS

As portrayed dramatically by a photograph on this page, one of the definitive series of Polaris test vehicles was successfully fired from Cape Canaveral on March 18. The firing was the first to be made from the ship-motion simulator constructed for the Polaris programme by the Loewy-Hydropress Division of Baldwin-Lima-Hamilton Corp. It had previously been believed that this simulator terminated in a conventional above-ground launcher, the Polaris first-stage motor being fired with the missile at rest. It is now clear, however, that the simulator incorporates a submarine-type firing tube.

As in the *George Washington* class of ships, this tube shoots the Polaris into the air (from either the surface of the sea or under water), the rocket not being lit until the weapon has reached a height of some 70ft. The first stage is just firing in the photograph. Many test firings have been made in California with launching tubes both above ground and submerged, but the March 18 firing was the first in which a real missile was launched by its pneumatic tube. The weapon achieved successful first-stage ignition, separation and second-stage ignition, and a range of over 900 miles.

Another Polaris was fired by the same method (and doubtless from the same tube) at Cape Canaveral on March 25. Photographs of this firing taken at an altitude of approximately 100ft show the base of the Polaris surrounded by pieces of material blown out of the tube with the missile. It is clear that these are in fact shoes which locate the missile in the firing tube and which are jettisoned following first-stage ignition. It is doubtful whether they assist in reducing pneumatic leakage around the missile during the launch but they obviously prevent the thin stainless-steel skin of the motor body from rubbing on the launching tube. These shoes are still in place in the March 18 photograph. The March 25 missile also flew a successful 900-mile mission.

FIRST SHOTS PLANNED

Presenting the $915m budget appropriations request of the National Aeronautics and Space Administration for Fiscal Year 1961 in Washington on March 28 before a subcommittee of the Senate Committee on Aeronautical and Space Sciences, NASA Administrator T. Keith Glennan gave details of the planned launching schedule for the forthcoming family of multi-purpose US rocket vehicles. Initial launchings were quoted as:—

Scout, a relatively low-cost, utility vehicle, mid-1960.

Thor-Agena B, by the Department of Defense, mid-1960. (For the next year or so, NASA will use a less powerful interim vehicle in the general class, the **Thor-Delta,** scheduled for initial launch in April 1960.)

Atlas-Agena B, by the Department of Defense, late 1960; by NASA in mid-1961.

Atlas-Centaur, the first system to use liquid hydrogen as a fuel, in 1961.

Saturn (if granted full 1961 budget request), static test of eight-engine cluster, spring 1960; launch of first stage with dummy upper stages, by summer 1961; two-stage vehicle, autumn 1962; three-stage vehicle, late 1963; first operational vehicle, before end of 1964.

"Looking farther down the road, and another billion-plus dollars into the future," Dr Glennan continued, "we expect to have the Nova vehicle, consisting of a cluster of F-1 engines, with total thrust of six to twelve million pounds, some time after 1965."

SNAP-8 NEGOTIATIONS

An $8m contract to build SNAP-8, a nuclear electric power generating system for spacecraft, is being negotiated between the National Aeronautics and Space Administration and Aerojet-General Corporation. The reactor for SNAP-8 is already being developed by separate contract to Atomics International, a division of North American Aviation, from the Atomic Energy Commission. The system, which should be ready for flight in about five years' time, should generate 300kW and operate for a year.

This Polaris, virtually identical with the operational weapon, was fired pneumatically from the ship simulator at Cape Canaveral on March 18. The jettisonable launching shoes are still in place around the body

Missiles and Spaceflight . . .

SKY BOLT PROSPECTS

During the past three months the British Ministry of Defence have become increasingly conscious of the fact that a ballistic missile designed for "hard" emplacement is extremely costly and by no means invulnerable. To be specific, the Blue Streak LRBM is going to cost more than had originally been hoped; and with about 300 high-yield warheads a potential enemy could destroy everything in the British Isles, including any Blue Streaks which might be based here. As a result our Defence and Air staffs have been taking a closer look at delivery systems which do not need a fixed base.

RAF Bomber Command will shortly have the Blue Steel stand-off bomb (this page, March 11). But even Avro, the prime contractor, would agree that in the present state of the art an aerodynamic-cruise weapon of limited range—even a good one—is not the best that can be achieved. The US Navy will have one submarine operational with the Polaris ballistic missile by the end of the year, and the nine ships so far authorized will mean 144 Polaris deployed at sea by the end of 1962. The Royal Navy, however, does not have the kind of money needed to buy such weapon systems, and even with unlimited finance could not produce its own submarine-missile system before about 1966 (most Admirals would consider even this optimistic). One is left with Sky Bolt.

Sky Bolt is the first air-launched ballistic missile (ALBM) to be developed in the West. The concept of an ALBM originated with the US Air Force early in 1957. In that year the decision was taken to invite technically capable companies to conduct feasibility studies, and this materialized as an investigation of Weapon System 199. Using money from Fiscal Year 1958, contracts were placed with Lockheed/Convair, Martin and McDonnell. All the work was of a low-cost nature, and it was aimed at finding the answers to such basic problems as establishing the basic design of an ALBM, sorting out the problems of navigation and guidance of the parent aircraft and the missile, and determining the likely accuracy, timing and cost.

All three contractors fired many full-scale test vehicles (one is illustrated here) and their reports indicated that the system was feasible, the optimum configuration being that of a slender two-stage vehicle with a solid-propellant charge in both stages. Accordingly the USAF wrote the requirements for Weapon System 138A; 15 companies submitted proposals, and last May Douglas Aircraft were awarded the prime contract, following the usual intensive evaluation by the Air Force Source Selection Board (made up of members of AMC, ARDC and SAC) and a review of the technical, management, production and other capabilities of the firms concerned.

Although Douglas have been awarded the prime contract WS-138A is a co-operative effort, and it incorporates all the knowledge, and some of the components, stemming from the feasibility studies. Early this year the Department of Defense allowed the programme to move out of the research phase and to enter full development, and an accelerated programme was announced in February. In the next financial year, beginning on July 1, about $60m will be spent on it. Designation of the missile is GAM-87A Sky Bolt. In August last, Aerojet-General were named as sub-contractor for the propulsion system. In October Douglas revealed their choice of the Nortronics Division of Northrop as sub-contractor for guidance. General Electric have been assigned the task of developing the re-entry vehicle.

A "Flight" artist has worked on the photograph (top of page) of Vulcan B.1s to give an idea of how Sky Bolt might be carried and fired. Although Sky Bolt itself has yet to be built, many test vehicles were fired during the WS-199 programme. Below is shown a WS-199B vehicle developed by Martin, one of which was launched on October 13 last into the vicinity of the Explorer 6 satellite

The design range of the missile is 1,000 to 1,500 n.m. Owing to its modest size (launch weight will be about 9,000lb) two or more can be carried by most bombers, and when hung from a pylon it will offer little drag. Although the parent aircraft could pull up into a climb before launching the missile, the optimum procedure is for release to be made in level flight at about 40,000ft. Initially it will drop free; then, following first-stage ignition, it will climb ahead of the bomber and describe a ballistic out-of-atmosphere trajectory. The need to pull up from level flight means that the weapon will either have aerodynamic controls or, more probably, will have jetevators in the multiple nozzles of the first-stage engine.

Nothing about the system appears likely to give any trouble except for the question of guidance. Never before has the guidance problem been quite so acute; the launch point must be fixed precisely in space in all three dimensions, and the time of launch and the need to establish cut-off at exactly the right point will also require further research. In the case of Hound Dog (the USAF equivalent of Blue Steel) a stellar/inertial system is employed, star-trackers in both the missile and its pylon being employed to monitor the inertial system and improve the navigation of both the Hound Dog and its parent aircraft. Blue Steel has an all-inertial system (by Elliott Bros) which is linked with the navigation of the parent aircraft.

In conclusion, it is worth noting that the concept of an ALBM removes much of the burden of penetration from the parent aircraft, so that the latter need not be a "bomber" at all. Even propeller-driven machines have been suggested in America, in order to reduce the cost of maintaining a standing patrol of Sky Bolt launchers. Operational capability of GAM-87A is scheduled for 1963, and by the end of that year most B-52G and B-52H aircraft of SAC should be carrying one under each wing. If production Sky Bolts were simply sold to the United Kingdom on a cash basis—we could readily develop our own warhead—there seems little reason why Bomber Command should not be operational with it in 1964. Both the Victor and Vulcan could use the missile, and so could any other big jet aeroplane. W. T. G.

Late last month the first US Army Lacrosse battalion sailed for deployment in Germany. The second battalion will follow this month.

For two years some 290 Greek officers and men have been training on US Army missiles at Fort Bliss, Texas. By July a Nike-Hercules battalion is expected to be deployed in their own country.

On March 16 US Army troops at White Sands fired a Redstone containing a damage-assessment capsule. The idea, which may become standard, is that the capsule should be ejected shortly before impact and, while descending by parachute, transmit TV pictures of the results of the strike.

A Martin Titan C-series ICBM was successfully launched from Cape Canaveral on March 22. The two-stage weapon flew more than 5,000 miles down-range, and the USAF stated that "all test objectives were met and the nosecone landed on its intended impact area." The nosecone was subsequently recovered near Ascension Island.

It was revealed by "an American military spokesman" on March 14 that in January a USAF Matador bombardment missile "veered off course" during a flight from the Chinese Nationalist-held island of Formosa. Apparently Matadors are frequently fired eastwards from Formosa, but on this occasion the big missile crashed in the Formosa Strait between the island and the Chinese mainland.

Lear Inc have received $2.25m to enable their instrument division at Grand Rapids, Michigan, to continue working on the gyroscopic reference unit in the radar guidance system of the US Army Nike-Zeus. The new contract brings to $9.3m Lear's total participation in Zeus since their original contract from Bell Telephone Laboratories in March 1957.

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Missiles and Spaceflight . . .

PIONEER 5 AND ITS ORBIT

LAUNCHED from Cape Canaveral by a three-stage Thor Able at 1 p.m. GMT on March 11, Pioneer 5 achieved an orbit around the Sun very close to that scheduled. In this article, D. E. Smith, BSc, FRAS, and A. E. Smith, AIInfSc, GradRAeS, describe the payload of this new Sun satellite and discuss current launch and orbital techniques for solar probes.

PIONEER 5 is a 26-inch diameter instrumented sphere weighing 90lb. It carries five basic research instruments plus the necessary electronic equipment for storing and transmitting the instrument readings back to Earth.

As might be expected, instruments for the furtherance of radiation studies make up quite a high proportion of the payload. An ionization chamber and a Geiger-Müller tube measure the total radiation flux encountered and weigh approximately 2lb. They are particularly sensitive to medium-energy radiation. High-energy radiation is measured by a counter consisting of seven cylinders filled with argon gas, and these are arranged so that one is encircled by the other six. The striking particles penetrate one or more cylinders, depending upon their energy, and ionize the argon, causing an electrical "blip." The weight of this unit is 5lb.

A magnetometer weighing only 1lb is included to determine the strength and direction of magnetic fields in space; this instrument is no doubt included because of the known relationship between radiation intensity and magnetic field patterns. Also included in the payload, accounting for almost another pound, is a micrometeorite counter. This instrument not only measures the number but also the momentum of meteoric dust particles striking the probe.

To enable the significance of the instrument readings to be properly understood, a half-pound photo-electric cell, known as an aspect indicator, is made to trigger an electrical impulse whenever it points straight at the Sun.

Pioneer 5 carries two radio transmitters, one of 5W and the other of 150W power. Both transmit on a frequency of 378Mc/s and obtain their power from batteries charged by 4,800 solar cells mounted on four "paddle-wheels" measuring approximately 18 × 14in, which protrude from the central sphere. The transmitters operate on command from a ground tracking station and relay back to Earth the stored instrument readings. The satellite's receiver, therefore, is listening out the whole time. The 5W transmitter is expected to have a range of about five million miles, and it is hoped that the 150W transmitter will enable the probe to relay back information up to about 50 million miles.

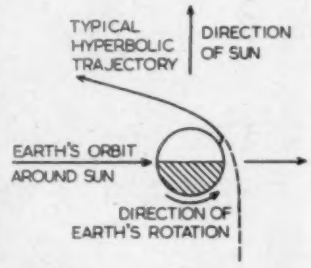


Fig 2. Initial path of a solar probe launched into a typical hyperbolic trajectory (dotted section shows continuation of hyperbolic curve)

This latest US achievement may perhaps be better understood by discussing some of the launch and orbital problems associated with solar probes. As might be expected, probes which leave the Earth in the same direction as the Earth's motion round the Sun enter orbits lying outside that of the Earth, because their velocity about the Sun has been increased. Probes launched in the opposite direction have their velocity relative to the Sun decreased and hence fall into orbits closer to the Sun. A solar probe is therefore launched so as to leave the Earth's sphere of influence with a large velocity component in the opposite direction to the Earth's motion. (The Earth's sphere of influence is the sphere inside which the Earth's gravitational attraction predominates, and outside which the centre of attraction is the Sun. The radius of this sphere is about 575,000 miles.)

To escape from the Earth the probe's velocity at burnout must be greater than the escape velocity and this makes the probe follow a hyperbolic trajectory within the Earth's sphere of influence. Thereafter the trajectory is an ellipse about the Sun. Should the velocity at burnout be less than the escape velocity the probe would either return to Earth and burn up in the denser layers of the atmosphere, or become another Earth satellite in an elliptical orbit.

The particular hyperbolic trajectory followed by the probe depends upon its velocity, range and direction of travel at burnout.

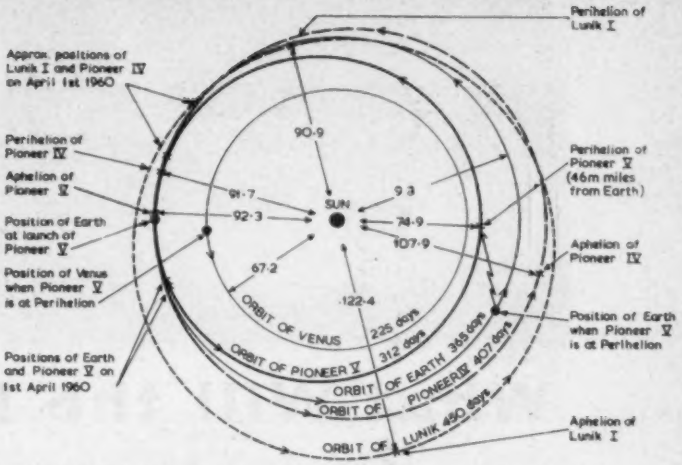


Fig 1. The orbit of Pioneer 5 in relation to those of other bodies in the solar system. Distances indicated from the Sun are measured in millions of miles. Planetary orbits are actually slightly eccentric

Similarly the orbit around the Sun which the probe enters depends upon its velocity and direction of travel as it leaves the Earth's sphere of influence. The greater the velocity component (relative to the Earth) in the opposite direction to the Earth's motion, the closer the resulting orbit will be to the Sun. This component can be increased slightly by taking advantage of the Earth's rotation on its axis, and this is achieved by turning the probe in an easterly direction shortly after launch. It is interesting to note that the combined effect of the easterly turn after launch and the shape of the hyperbolic trajectory means that the local time at launch must be between 6 a.m. and 12 noon (this is illustrated in Fig 2).

The planned burnout velocity of Pioneer 5 was a little over 25,200 m.p.h. This in conjunction with an 8 a.m. (local time) launch from Cape Canaveral would have placed the probe in a 295-day orbit intersecting the orbit of Venus at its perihelion (its closest approach to the Sun). In reality the probe's burnout velocity was 24,869 m.p.h. and, in consequence, it entered an orbit with a period of 312 days and a perihelion distance of 74.9 million miles. This means that its nearest approach to the orbit of Venus will be about 7.7 million miles.

It will be noted from Fig 1 that the perihelion position of the orbit of Pioneer 5 is very slightly less than 180° away from the launch position—measured in the direction of motion. This is a result of the probe having a small velocity component towards the Sun when it left the Earth's sphere of influence. Had there been no such component, the perihelion would be exactly 180° away and the aphelion (greatest distance from the Sun) would be coincident with the probe's point of exit from the Earth's sphere of influence.

Similarly, if the velocity component towards the Sun had been negative the perihelion position would have been slightly greater than 180° and the probe would in fact have passed through aphelion shortly after leaving the Earth's sphere of influence. A complicating factor is the slightly eccentric orbit of the Earth. At present the Earth is moving away from the Sun and this motion is naturally possessed by the probe at the time of its launch from the Earth.

An advantage of the perihelion position being less than 180° is that the probe should still be within radio range of the Earth when it passes through this position. The distance between the probe and the Earth at this time is predicted to be about 46 million miles, and this will occur in mid-August this year. If the perihelion position had been only a few degrees greater than 180 it is likely that the probe would have been greater than 50 million miles away—the estimated range of the high powered transmitter—when it passed through perihelion.

Pioneer 5 is the third artificial Sun satellite but the first solar probe. The other two satellites, Lunik 1 launched on January 2, 1959, and Pioneer 4 launched on March 3, 1959, were launched in the direction of the Earth's motion round the Sun and hence lie in orbits almost entirely outside that of the Earth (these orbits are shown in Fig 1).

These satellites ceased transmitting before they reached the edge of the Earth's sphere of influence, and so Pioneer 5 is the first satellite to transmit information back to Earth whilst actually in orbit round the Sun. Pioneer 5 passed out of the Earth's sphere of influence and into its Sun orbit on March 15, 1960, approximately five days after launch. It is not expected to come within a few hundred thousand miles of the Earth for perhaps thousands of years, but it will come within radio range again in mid-1965. If its transmitters still transmit on command at that time, the satellite will surely hit the headlines again.

"The then CAS, Sir John McAuley, liked the F-104 . . ."

THE SERVICE KNOWS WHAT IT WANTS,

BUT POLITICS STILL OBSCURE THE ISSUE

By Stanley Brogden

What Will the RAAF Buy?

Melbourne, March 18

A RECURRENT subject for Australian newspaper editorials and questions in Parliament is what type of fighter the RAAF will select as a replacement for the Avon-Sabre. This is rapidly developing into a political issue, for while the decision has been postponed again and again for the past six years, the Commonwealth Aircraft Corporation is almost literally starving to death for an order.

In 1955 the RAAF Mission, led by AVM A. M. Murdoch (now Australian Defence Representative in London), had four recommendations to make on its return from the USA and England: The F-104 was the fighter which most fitted RAAF specifications; the Vampire Trainer was the most suitable advanced training aircraft; the Viscount was the best VIP transport; and the C-130 Hercules was the right heavy transport.

Sadly, the Viscount was not at that time readily available, and when the then USAF Chief of Staff personally offered Sir Donald Hardman ("on loan" from the RAF as RAAF Chief of Staff) two Convair 440s right off the line out of the USAF order, they had to be accepted. The RAAF has always regretted this, for it considered Viscounts the best and would still like them. However, the Prime Minister, Governor-General and Royalty fly around Australia in an American piston-engined aircraft; and if Britain did not consider this important enough to give the RAAF priority, as the USAF did, the Australians can hardly be blamed.

The C-130 had no rival and 12 are in service, with another six to be ordered—if and when money becomes available. The Vampire Trainer was quickly put into production and 62 are well on their way from de Havilland at Bankstown, near Sydney.

The fighter issue has still to be settled. There was no British fighter design the RAAF liked. The then CAS, Sir John McAuley, liked the F-104, and but for his retirement an order might well have been forced through. Air Marshal Sir Frederick Scherger has never been an F-104 man, and he was proved right by the indifferent record of the first marks, which lacked the flexibility the RAAF required. However, the much improved F-104G, which has captured most of Western Europe, has impressed the RAAF. A mission headed by the Director of Operations, Gp Capt W. E. Townsend, looked over the British and American industries early last year, but no definite results followed. The mission had in fact to report on a missile (Bloodhound was quickly ordered), a fighter, a light transport, and a primary jet trainer, as well as a long-range ASW type. Regarding the last-named, the report merely confirmed what the RAAF staff already believed: that the Neptune P2V-7 was still good enough to buy, and a squadron (No 10) is being re-equipped with it, replacing the long-nose Lincolns.

The light-transport specification is pretty well identical with that of the Herald, the advantage of the Handley Page aircraft over the Friendship being its ability to fly Darwin - Butterworth non-stop with full load. The RAAF needs 14 of them; but if the Herald is not soon available the Friendship must be ordered.

The primary trainer question is still open. The RAAF has been evaluating the Jet Provost for some months at Point Cook, with excellent results; but militating against this aeroplane, it is felt, are its appearance and its rather limited role. The RAAF has had some very close looks at the Macchi 326, which is attractive to the eye and is capable of taking the student right to the point at which he can climb into the two-seat version of the operational fighter. It is also very easy to make, and Commonwealth Aircraft Corporation could meet the production order for 100 easily. The third candidate is the Canadair CL-41, which has the advantages of the Macchi but is relatively expensive and more difficult to produce. Its advantages include the fact that it would be a very good ground-attack aircraft in bush warfare.

"Further attractions for the RAAF are that it is cheap, easy to construct and can be used in several roles"—the N-156F

Canadair have a representative in Australia (J. H. O'Hara), who is pushing the trainer with the idea of buying out CAC as a subsidiary of Canadair (and hence of General Dynamics); it is known that this US giant wants a leg in the South Pacific - South East Asian area. Canadair have had several high-level discussions with CAC about purchase of the firm as a going concern.

Such a deal would raise deep political issues. The new leader of the Opposition (Arthur Calwell) is making a sustained attack on the Government. Defence is a key issue; so is the increased participation of powerful overseas concerns in the Australian economy. The sale of a non-profit-making concern like CAC to America would have considerable repercussions. Nevertheless, CAC is coming to the end of the Avon-Sabre order with nothing in sight to replace it. Skilled personnel have been leaving the firm for several years. The situation is bad and it has been the subject of many attacks on the Government.

Another stage has now been reached. In June another mission, led by the officer who will almost certainly succeed Sir Frederick Scherger as CAS next year, AVM V. E. Hancock, will go to America and Europe. The Defence Minister, Athol Townley, has announced that this mission will test-fly and otherwise evaluate three fighter types—the F-104G, Northrop N-156F and Mirage IIIC. The flying will probably be done largely by the finest technical test pilot the RAAF has, Gp Capt D. R. Cuming.

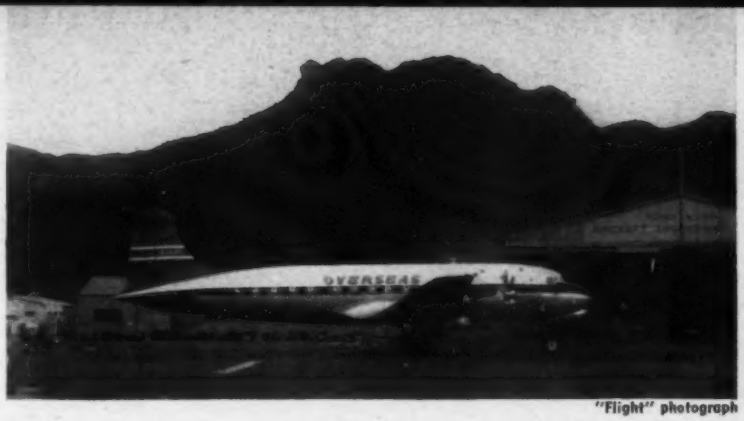
But the issue will not be decided on pure operational merits. Other questions will be asked: What will be the comparative

(Concluded on page 440)

The Mirage IIIC—"between the F-104G and the Mirage IIIC the RAAF feels there is little to choose . . ."

INTERNATIONAL INDEPENDENT

Overseas Aviation's Sixfold Expansion in Two Years



"Flight" photograph

STARTING operations exactly two years ago with a fleet of three Vikings, Overseas Aviation (Channel Islands) Ltd now operate five 36-seat Vikings, nine ex-BOAC 65-seat DC-4M Argonauts, and a Dove.

This sort of expansion—a 600 per cent increase in capacity in two years—is probably unparalleled in UK airline history. It certainly does not seem compatible with the frequently voiced UK independent airline complaint about limited opportunities. Undoubtedly the most remarkable aspect of the company is, as implied by the name, its international diversification.

Overseas Aviation is one of 38 companies in the Overseas Group, which has grown out of a small car distributing and insurance agency launched in Germany in 1949 by Ronald Myhill, an ex-RAF pilot. He and B. A. Dromgoole formed Overseas Aviation in January 1958. Both these men are British, and their co-directors are Capt P. de Vere Stevens, technical director, and Capt B. D. Ludbey, chief pilot—both Australians.

It is to Ronald Myhill and Bernard Dromgoole that the German independent operator Lufttransport Union, LTU, owes its origins (*Flight*, July 20, 1956, page 111). They founded LTU in February 1955, initially to carry on business as brokers and handling agents for BKS and Transair—Mr Dromgoole having previously been European manager of BKS.

Total work-force of Overseas Aviation now amounts to 187 employees, including 23 captains and 22 first officers, and stewardesses of various nationalities. Staff, say Overseas, "will soon have to be increased in all departments." Total turnover of the aviation companies in the Overseas Group was more than £1m in 1959 and "we expect to pass the £2m mark in 1960."

Overseas Aviation are registered in the Channel Islands, like some of the other companies in the Overseas group. This arrangement has been found to enable, among other things, contracts to be clinched more readily.

The company's main engineering and operating base is at Southend, but a complete transfer to Gatwick will start this month. The move should be completed in September. A new £300,000 hangar is now going up at Gatwick; of Scandinavian design, it is unusual in that it is of wooden construction, the argument being that the risk of fire damage to aircraft is no greater than, and is probably less than, with a metal hangar.

The story of Overseas' efforts to move to Gatwick is, incidentally, difficult to reconcile with the Ministry's stated policy of encouraging operators to move to this expensive, and still sadly under-utilized, new London airport. Overseas applied to the Ministry in June 1958 for permission to build a maintenance hangar there. It took 11 months and finally a strong letter to the Minister himself to obtain the approval, which was ultimately granted on June 3, 1959. It then took a further six months to conclude the lease, although the general terms had been decided within a few weeks of the approval. These delays prevented Overseas from having their hangar this winter, and they claim that the delay has cost them about £50,000 in respect of major maintenance contracted to other companies.

Overseas' main activities are inclusive tours, both from the UK and from the continent of Europe, and charter and contract work to the Far East, Australia and South Africa. Their brokers on the Baltic are Lambert Brothers. One of Overseas' five Vikings is based at Manchester with the northern division, and it operates charter and contract work from that airport, and from time to time from Liverpool.

An important associated company is Trans-Africa Air Coach—Overseas TAAC—well known in South Africa for the very-low-fare Argonaut services operated from Luxembourg to Lourenço Marques in Portuguese East Africa. The use of these two terminating countries avoids political complications as regards traffic rights. As *Flight* learnt during a recent visit to Africa, the established carriers between the UK and South Africa, particularly SAA, regard the Overseas TAAC operation as causing material diversion. Overseas reply to this by saying that material diversion, if any, would be caused more by the greater-frequency Trek Airways coach service (whose operation was described in *Flight* for March 4, 1960). We remain neutral pending a definition of the words material diversion. The Overseas TAAC service frequency is low, being only monthly, but a monthly service available directly to the public would contravene the Air Corporations Act were it operated from UK territory. This is why Luxembourg is the terminal.

The Trans-Africa Air Coach service has certainly proved popular—particularly among South Africans, in whose country the main sales effort is made. The fare is £75 or £90 one way, depending on the season. This includes transport between Portuguese East Africa and South Africa, and between Luxembourg and the UK. The comparable IATA tourist ticket between the UK and South Africa costs £152, so the reduction amounts to about 40 to 50 per cent. This is "VLF" actually in operation.

By agreement with the Portuguese authorities (presumably in return for the traffic rights at Lourenço Marques) a 48-hour double night-stop is made at Lisbon on the north-bound flight. All Trans-Africa Air Coach flights are operated with 65-seat Argonauts bearing the name "Overseas TAAC."

In addition to the Trans-Africa Air Coach operation, but having no connection with it, is an Argonaut service operated at a frequency of ten flights per year from Southend to Lourenço Marques. These are "closed group" operations operated on behalf of the Overseas Visitors Club, a private organization which has recently opened new premises in London, with accommodation for more than 200, and with a bar, ballroom and other recreational facilities. (A £250,000 contract with SAA for VLF flights between the Union and the UK has, incidentally, just been signed by the Overseas Visitors Club—see *Flight*, March 11.)

The initials TAAC are registered in two other ways: they stand also for Trans-Australia Air Coach and Trans-Atlantic Air Coach. It can therefore be assumed that Overseas are hoping to be able to arrange very low fare services (possibly with DC-6As or -Bs) to the destinations implied in these two other names on a basis similar to the Luxembourg - Lourenço Marques operation. The French have already granted Overseas rights to operate into Noumea in New Caledonia. This is about 900 miles from Sydney, with which city connecting flights with the French independent TAI could no doubt be arranged. But there has been such strong opposition from the Australian Government that it has so far been found impossible to operate a feeder-service from New Caledonia to Australia. Overseas feel that there would be a tremendous demand for a VLF service to and from Australia if only the attitude of the Australian Govern-

Overseas' first Argonaut, G-ALHT, has been sold to the new Danish operator Flying Enterprise. Above, an Overseas Argonaut is seen at Hong Kong

INTERNATIONAL INDEPENDENT . . .

ment would alter. The Australians recently cancelled TAI's Australian traffic rights, after a disagreement which has subsequently been patched up, for reasons which were probably partly related to France's granting rights in Noumea to Overseas. Whether or not a Luxembourg - Noumea operation by Trans-Australia Air Coach would divert much traffic from the Kangaroo service of Qantas and BOAC remains unproven.

It is possible, too, that Overseas, having registered TAAC also as Trans-Atlantic Air Coach, are not unaware of similar opportunities for "adjacent" air traffic rights in the Western hemisphere.

Overseas have offices at Frankfurt and at Templehof Airport, Berlin, the latter being the company's main office on the Continent. An Argonaut and one or two Vikings are occupied on inclusive tour work out of Berlin, as well as flights on behalf of the Berlin Senate. These operations are in accordance with the Allied agreement whereby air transport between the Federal Republic and West Berlin is carried out by the carriers of the three occupying powers. In addition to the operations between Berlin and Western Germany, a large number of inclusive tours and charter flights are operated from the Federal Republic.

Another name associated with Overseas is Flying Enterprise. This is a Danish company, formed last year with Danish capital, based at Copenhagen. It operates inclusive tours and charters. Flying Enterprise has an agreement to purchase two Overseas' Argonauts, one of which is now sold and in Flying Enterprise's colours and with a Danish registration (see photograph). Overseas have a long-term maintenance and operating contract with Flying Enterprise, who also act as Overseas' main agents in Scandinavia. A large volume of inclusive tour business is operated by Flying Enterprise for Scandinavian holiday-makers bound for the Spanish, Italian and Mediterranean resorts so popular amongst British holiday-makers—like Palma, Rimini, Rome, Tenerife, and so forth.

Overseas as yet operate no scheduled services from the UK, but they have applied to the ATAC since the summer of 1958 to operate 11 services between Liverpool and Manchester and points on the Continent. Only one of these has so far been granted, from Liverpool to Paris. It is due to start on June 1, though at the moment it is not cleared by the French authorities. Nine applications were rejected, but one other (Liverpool to Rotterdam) is still under consideration. The majority of the objections came from BEA, who alleged material diversion of traffic originating in the Manchester area. Overseas contend that Liverpool is a traffic area entirely separate from Manchester.

Overseas have "close working arrangements" with a number of independents based on the continent of Europe, these being used as a source of business in accordance with the policy of diversifying the company's interests as widely as possible.

That Overseas is not an operator with all its eggs in any one political basket could well be one of the secrets of its success. And, in a section of the industry infected by galloping mergeritis, it likes to think of itself as an independent which intends, come what may, to remain independent.

J. M. R.

WHAT WILL THE RAAF BUY? (continued from page 438)

costs of manufacture by CAC and overseas? Will other nations grant time payment terms, as the US probably will? What will be the time-factor involved in local production? An order for 100 would give CAC a production rate of about one a week.

The RAAF needs an aircraft of considerable flexibility and long range, and capable of M2 or more. Flight trials of the N-156F are showing that aircraft in a better light than was believed, and the company claim it will eventually exceed M2 carrying half its own weight in external stores. Further attractions for the RAAF are that it is cheap, easy to construct and can be used in several roles. An open question is the engine. There is no doubt that the RAAF decision has been postponed until the aircraft is at the stage at which RAAF pilots can evaluate it, but Sir Frederick Scherger has always been keen on it.

Between the F-104G and the Mirage IIIC the RAAF feels there is little to choose, except that while the French aircraft might be cheaper the American has more experience behind it. The shocking accident rate of the early F-104 series has not impressed the RAAF, but the performance has. The Mirage is a relatively little-known quantity as a weapon system—and so, to Australia, is the entire French industry. The RAAF would not accept the French Atar 9 engine, but would insist on a Rolls-Royce. As the export Mirage is being offered powered by the Rolls-Royce RB.146, while no British engine has yet been fitted to a trial F-104, the French at least have that advantage. (The Lightning, by the way, is not in the picture as a fighter for the RAAF. This is not to question its appeal to the RAF, but many people in the British industry just will not admit that the RAAF has its own requirements and knows best what it wants.)

A further French selling-point is the Mirage IVA. The RAAF needs a Canberra replacement some day, and the idea of using the IVA as a bomber, with some parts and techniques common to the IIIC, has obvious appeal. The RAAF is definitely interested in this proposal, which could swing the balance in favour of the French. But here again economics could well force the use of the Starfighter as a Canberra replacement. Meanwhile, the mission will examine other bomber prospects, including the Saab Draken and the Blackburn NA.39. [Surely the Vickers/English Electric TSR.2 is the obvious choice.—Ed.] The British aircraft is a definite prospect for the bomber role. Any bomber ordered would not be manufactured in Australia, as only some 30-40 would be required.

A RAAF order for trainers (the mission will examine these) and/or fighters will alone save CAC. It is very probable that such an order would be shared with the Australian de Havilland company, which is in a similar position. The Government Aircraft Factory will not produce another manned aircraft, but will concentrate on the Jindivik and missiles.

The Service at present has three squadrons of Sidewinder-equipped Avon-Sabres, two at Butterworth and one at base in Williamtown, NSW. The intention would be to re-equip two squadrons, but to keep the third operating Avon-Sabres. A fourth fighter squadron is being formed from the personnel freed by the decision to abandon the Citizen Air Force's five flying squadrons. This unit would also be equipped with Avon-Sabres. The RAAF regards the Avon-Sabre, with Sidewinder [an air-to-air missile—Ed.], as the finest ground-attack aircraft in the world, ideal for Asian conditions.

All these decisions are perhaps affected by reports that the Indonesians are seriously considering the Mirage III as a replacement for the Mig-15, despite Mr Khruschev's visit. An occasional report of Indonesian interest in the F-104 is not taken seriously, even by the Americans. In spite of diplomatic disclaimers, the continued Indonesian threat against Dutch New Guinea is the only real trouble-spot contiguous to the Australian frontier.

Finally, it should be remembered that the RAAF has only some £A60,000,000 (under £45,000,000 sterling) to provide for its pay, facilities, and everything—even the purchase of new aircraft. Economics are therefore the key factor in new orders. Australia cannot afford a mistake. In the event, then, the N-156F and the Mirage IIIC-IVA possibilities are considerable.

It should also be remembered that the RAAF is not anti-British, as some newspapers would have you believe. It simply wants the most suitable aircraft in regard to its economic position and its operational requirements. A short reading of history and geography will demonstrate that these cannot be identical with those of the RAF, and it does Australian-British relations no good to insist that we should buy British aircraft regardless of our personal requirements. One in four of all the RAAF personnel, ground-crew and aircrew, who served in Europe in 1939-45 were killed. That speaks for itself.

FORTHCOMING EVENTS

April 6. RAeS Graduates' and Students' Section: "Thirty Years of Aeronautical Journalism," by Thurston James.
April 7. RAeS (Main Lecture at Coventry Branch): "Optimum Size of Rocket Engines," by J. E. P. Dunning.
April 7. British Interplanetary Society: "Lunar Missions and Vehicle Design," by J. Allen.
April 7. Society of Instrument Technology (Data Processing Section): "The Electronic Computer in . . . Missile Trials," by W. C. J. White and D. L. Overheu.
April 7-9. College of Aeronautics, Cranfield: Flight-test Instrumentation Symposium.
April 8. RAeS Rotorcraft Section: "Experiences with an Operational Heliport," by R. A. C. Brie.
April 8-9. The Polytechnic (Regent Street, London): Symposium: "Helicopters—Their Capabilities and Economics."
April 13. British Institution of Radio Engineers (Computer Group): "Guided Weapon Control," by F. J. R. Spearman.
April 14-24. International Air and Space Exposition, Los Angeles.
April 19-21. International Airline Navigators Council: Tenth Annual Convention, New York.
April 20. London and Home Counties Regional Advisory Council for Technological Education, and Brunel College of Technology: Conference on the Selection of Materials.
April 20-22. Institute of the Aeronautical Sciences: National Symposium on Manned Space Stations, Los Angeles.

RAeS Branch Fixtures (to April 8): April 4, *Boscombe Down*, Film Show; *Cambridge*, Lecture by Wg Cdr R. P. Beamont; *Derby*, "The Vickers Vanguard," by G. F. H. Hemsley. April 5, *Glasgow*, a.g.m.; *Luton*, "Guidance and Inertial Navigation," by E. G. C. Bust. April 6, *Christchurch*, "Supersonic Transport Aircraft," by Dr R. G. Thorn; *Reading*, a.g.m. and Film Show; *Swindon*, "Experiences of an Airline Pilot," by Capt O. P. Jones. April 7, *Cheltenham*, a.g.m. and Film Show; *Isle of Wight*, "An Astronomer Looks at Space Travel," by A. F. Collins; *London Airport*, a.g.m. and Brains Trust.

FLIGHT SYSTEM SURVEY

Comets for Automatic Landing

Two Comets are to be modified for civil automatic landing, and trials will be carried out by the Blind Landing Experimental Unit at RAE Bedford in order to test civil equipment. A Comet 2E formerly used by BOAC for Avon RA.29 development flying and the Comet 3B are involved. Although it might be presumed that one will be fitted with Smiths Aviation Division equipment destined for the D.H.121 and the other with Elliott Brothers (London) equipment for the VC10, neither of these companies is prepared to comment.

Doppler for the Royal Navy

A CONTRACT worth $1.5m has been placed with Ryan Electronics by the Royal Navy for the supply of an initial quantity of AN/APN-97A Doppler navigators, spare parts and test equipment. The navigators are to be installed in Royal Navy anti-submarine helicopters and deliveries are to begin in May.

The AN/APN-97A is a self-contained Doppler ground velocity indicator which measures fore-aft, left-right and up-down movement of the helicopter. When combined with other equipment, it allows automatic hovering over land or sea in any weather and considerably assists sonar work.

The US Navy Bureau of Naval Weapons has placed with Ryan a contract worth $5,914,000 for AN/APN-130 Doppler navigators. To be installed in the latest anti-submarine helicopters, including the Sikorsky HSS-2 and the Kaman HU2K-1, the AN/APN-130 will allow sustained precision hovering under all weather conditions. Deliveries will start in April this year and continue until September 1961.

DME Procedures and Implementation

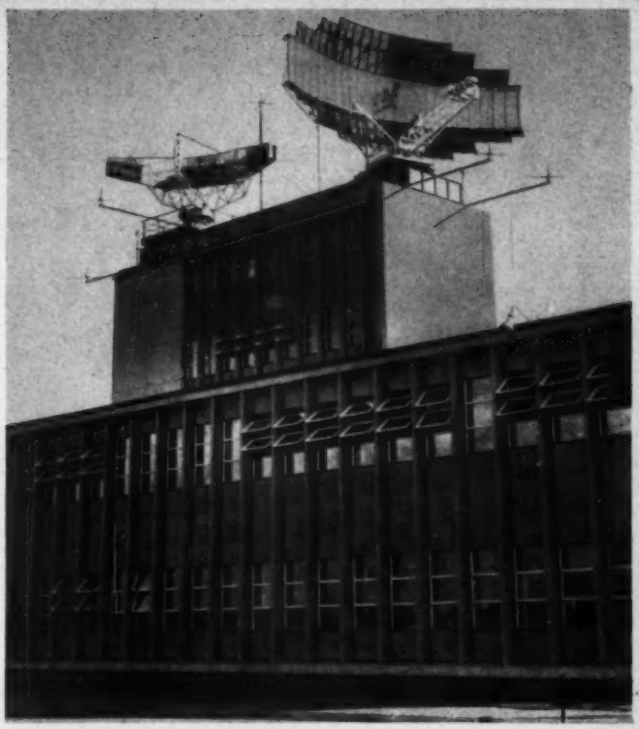
As part of what appears to be a co-ordinated programme to introduce Vortac in the United States, the Federal Aviation Agency has instituted airways procedures based on DME and has announced that orders will shortly be placed for DME ground equipment. (FAA reports on Decca Navigator and the use of pictorial indicators with VOR/DME have been discussed in *Flight* in past weeks, as have the decisions of the Air Navigation Commission of ICAO.)

The latest FAA statement reports the adoption of DME as the basis for longitudinal separation between aircraft on airways. The separation chosen is 20 miles between DME-equipped aircraft, which must also be in communication with the control centre. The new procedure "may apply to all properly equipped flights operating within or coming into the continental United States."

Vortac beacons (combined VOR and Tacan) are already being installed for military use. There are some 600 VOR beacons on the Federal Airways and 175 more are being obtained. Of the 600 VORs, 85 have been upgraded to Vortac by the addition of Tacan and another 170 Vortacs are operating on a test basis. About 160 VORs are operating outside the US. By the end of the fiscal year 1960 some 255 Vortacs will be operational in the US and a total of 1,100 are planned by 1965. "Increasing numbers of aircraft" are being equipped for distance measuring.

The recent ICAO EUMED meeting showed that most nations in this region are planning to implement DMET.

Here being tested in conjunction with a Creed teleprinter at Marconi's Basildon Works is the AD308 transistorized airborne teleprinter receiver which is now in production and has been ordered for BOAC Boeing 707s. It is used for receiving weather information broadcast on narrow-band, f.s.k. telegraphy at between 90 and 150kc/s. Broadcasts made from Scotland and Newfoundland provide complete coverage of the north Atlantic. The AD308 (in foreground below), which can receive any one of four spot frequencies, can be seen to be light and compact



The new C.S.F. surveillance radar with a range of up to 200 miles which was installed during March on the roof of the northern regional control and communications centre at Orly airfield, near Paris

Expanding Electronics Industry

THE annual review of the Electronic Engineering Association, recently issued, states that the gross production of the whole of the British electronics industry is at present about £475m a year. It doubled between 1951 and 1957. The Association covers the electronic capital-goods section of the industry, which was responsible for £160m gross production last year. It employed about 120,000 people and its direct exports were between £26m and £30m. About £13m were ploughed back into research and development.

Included in the capital-goods section are communications, radar, navigation aids, computers and industrial electronic control equipment, and the Ministry of Aviation is one of the major customers. The past year has seen the formation of the Electronics Industry Council as a link between electronics and related manufacturers and various other forms of liaison with foreign markets and trading associations.

Speaking at a recent luncheon, the Association's chairman, L. T. Hinton, expressed satisfaction that civil aviation had been given the independence of its own Ministry, but felt "some concern" that aircraft companies which had diversified their activities and entered the electronics industry should be indirectly assisted in doing so by Government subsidies for aircraft production.

Computer Programming Courses

ENTITLED *Management Practice and the Systems-Analyst*, a six-week course is being run by Production-Engineering Ltd from April 25 to June 3 at 12 Grosvenor Place, London SW1. The object of the course is to broaden systems-analysts' knowledge of management principles and techniques and so improve the general standard of computer data-processing. The five subjects to be covered are management organization and production control; analytical study of work; financial and management accounting; office administration; and computers and associated problems. Enquiries should be addressed to Courses Secretary, Management Training (P.E.) Ltd, Park House, Wick Road, Egham, Surrey.

Air Safety must be ENFORCED

AN AVIATION LAWYER'S OPINION

THE author of this article, who cannot for professional reasons disclose his name, welcomes the proposed new air safety legislation, but asks whether an air operator's certificate will be sufficient in itself without adequate enforcement by a Ministry air-safety police force.

IF one result of the Minister's proposals for air safety is to ensure greater Treasury support for the country's efforts in this direction, then the ideas deserve the warm approval that they have obtained from both sides of the House. Otherwise the proposals must be denounced as unnecessary and inapt. Unless the ideas result in the stronger *enforcement* of safety regulations, they will fail completely.

The proposals are excellent both theoretically and politically. "In future," says the Minister, "all commercial operators, without exception, will have to obtain what is to be called an air operator's certificate." This will certify that "from the standpoint of safety, an operator's aircraft are of a suitable type and that his maintenance system, operational staff and organization are up to the standard required. . . . Firms which are refused an air operator's certificate will have the right of appeal to an independent arbiter, who will be assisted, when necessary, by expert assessors."

Why then is it suggested that the proposals are unnecessary? What, it might be asked, could be better than the proposed system which (1) ensures automatic initial surveillance, (2) provides for permanent control by withdrawal, and (3) is scrupulously fair in operation by providing an independent umpire to judge appeals?

Answer: nothing. But there is very little which could not already be done within the *present* system of legislation if the Minister could mount a massive assault on air safety. He does not lack the powers. He has a nucleus of diligent staff. He may just not have enough men of the right calibre. Unless the new Bill brings more cash for air safety, there may be "no change" —and a mass of certificates and independent arbiters.

Southall and the Law

What are the reasons for the new proposals? The Southall disaster, said the Minister, "drew attention to the unsatisfactory state of the law." This is perfectly true. But the unsatisfactory state of the law did not relate to air safety. It may have had something to do with the powers of coroners. It may have revealed the unnecessary difficulties in the way of prosecutions for aeronautical offences. The only thing it did reveal unmistakably was how poorly the regulations were being enforced. The operator concerned had been reprimanded the year before for breaches of regulations on matters similar to some of those revealed in the public inquiry on the Southall accident.

It was, and is, the Minister's task to enforce the regulations. Does he lack any powers? Certainly not. Article 61 of the Air Navigation Order 1954 gives the Minister (or "an authorized person") power to detain aircraft or take other steps to *prevent* dangerous breaches of regulations and *prevent* unfit aircraft from flying. Is this any more "cumbersome" or less effective or more "difficult" [words used by Mr Rippon in this context] than the withdrawal of an air operator's certificate with a right of appeal? I think not.

Of course, no one would suggest that a law-enforcement agency can entirely prevent crime. But can the Minister honestly complain that "we have no power to insist that the same standards of safety are observed by operators of charter services" [as are observed by scheduled operators who have been examined by the Director of Aviation Safety]? Not only has the Minister the "power to insist," but the regulation standards (with some minor exceptions) are the same for all operations for hire or reward regardless of whether they are charters or scheduled services.

The idea that there are vast loopholes in the regulations has been accepted by both sides of the House. One Member, Sir Wavell Wakefield, even thinks that it is easier to put a four-engined charter aircraft into the air with 70 or 80 people on board than to put a "London taxicab . . . on the streets."

Are the proposals inapt? Yes, for two reasons: —

(1) The air operator's certificate is mentioned in the Licensing Bill principally to provide a convenient statement of policy. It does not need a new Act of Parliament to authorize the certificate; it will be expressly issued under Section 8 of the Civil Aviation Act 1949. Now that the Minister has announced his policy, there can be little harm in deleting Section 2(a) from the Bill and preparing the necessary Order in Council without delay.

(2) It is extremely doubtful whether the Minister is correct in thinking that appeals from refusals* of an air operator's certificate will involve questions of fact alone. The decision will be based on facts, but applied to certain criteria of acceptability. Unless the umpire is armed with the same criteria he cannot be a judge of fact. If he is to be given this information, and if, as the Minister says, it is desirable for the decision to be independent of the Ministry which exercises the original jurisdiction, then it will be ultimately necessary for the standards of acceptable safety to be published in full. This is not a bad thing. But it is equivalent to publishing more detailed regulations for adherence. Also not a bad thing. So why have an air operator's certificate if the same result in *standards* can be achieved by improved regulations?

There may be good arguments for appeals on questions of law, but not on questions of fact. Tight control of air safety demands that the authority charged with *enforcing* air safety be given absolute administrative authority to do so. This is the real lesson of US policy. Although the US requires an "air carrier operating certificate" for safety purposes, true control is exercised by means of detailed regulations which are now enforced well, if not too wisely (according to airline pilot complaints!) by a large, efficient field force.

There are dangers in analogies with American practice and it is perhaps too early to comment on the switch from having rule-making and investigation in one body (the old CAB) to having rule-making and rule-enforcement in one body (the new FAA). But it seems certain that all three functions do not happily reside in one body. The present strength of the Ministry (and of the ARB) seems to lie in rule-making. The salient weaknesses may be in enforcement.

Ex-Pilot Police Force?

Are the best features of the English police system a guide for the future? Would it be a good idea to create a separate aviation safety bureau with powers not only to initiate investigations (not confined to, but including accidents and incidents) but also to enforce air regulations? Due to the rapid onset of the jet era, many mature pilots of tremendous experience are approaching premature retirement: can their wisdom be used to augment an extensive programme of preventive inspection and regulation of future aircraft operations? With adequate guidance, their influence could possibly lead to an actual reduction in detail of the great volume of prohibitory regulations and could be an educative force of lasting value to the future of air transport. Without such guidance, however, such a system could easily degenerate into the capricious exercise of arbitrary power. There should, of course, always be ample opportunities for interchange of personnel, information and ideas with other administrations—e.g., in America and the Commonwealth. The exchanges with the FAA reported in *Flight* (March 11, page 335) are a welcome beginning.

Is it possible that air safety affairs are dealt with at too low a level in the Ministry? Might it be necessary, for example, to create a Director-General of Air Safety, who would possess the right kind of technical and operational qualifications?

A Possible Danger

Possibly the greatest danger in the issue of an air operator's certificate would be that the unscrupulous operator could use it as a liberty and licence to sail as close to the wind as he could in between visits from officials for renewal purposes. The certificate (like a Certificate of Airworthiness) might be based on examination at a given date and would have to be issued subject to the operator's compliance at all times with all relevant regulations. Operators already have this obligation both generally and as a result of their Certificates of Airworthiness. There is little reason to suppose that *by itself* the addition of another certificate is going to improve the attitude of the unscrupulous—who unfortunately have to be the lowest common denominator for legislation and control. Therefore unless the emphasis shifts to preventive inspection and enforcement, the mere existence of an air operator's certificate can do little to improve matters. Probably the biggest theoretical advantage of the certificate is the threat of its withdrawal acting as a deterrent. But in order for there to be sufficient information to warrant a withdrawal there first has to be adequate surveillance, inspection and investigation. The standards of investigation would have to be high enough to match up to the proposed right of appeal on *facts*. All of this, quite rightly, sounds just as difficult and exacting as obtaining evidence for a prosecution. What, then, remains of the deterrent advantage? Is it different from the threat of a prosecution—as at present?

Adequate surveillance, inspection and investigation are still the basic requirements. Coupled with these should be the means of ensuring the automatic supply of the fullest possible operational and statistical data, including the incidence of accidents and

(*Concluded on page 456*)

*Not "suspensions" apparently, or even "variations."

SURVIVAL DEPENDS ON VERSATILITY

IN DEFENCE AGAINST AIR ATTACK AS IN NATURE

The story of evolution is the story of success, or failure, in versatility. Those animals that could adapt themselves to changing conditions of life multiplied, flourished and survived. Those that were too set in their ways died out.

It is not only in Natural History that versatility – the ability to perform more than one function – is of critical importance. It is equally important in the field of defence against air attack. If we ever again have to defend ourselves against attack from the air, the one certain thing is that the pattern of attack would be chosen so as to make things as difficult as possible for the defence. The less flexible our methods of defence, the more easily they could be baffled.

VERSATILITY IN DEPLOYMENT

A vital weapon for defence against air attack is the guided missile. Missile systems can either be permanently sited on fixed concrete emplacements, or, like the English Electric Thunderbird, be made fully mobile, moved across country in standard military vehicles, and redeployed in a few hours.

The important thing is that the second category – and this means Thunderbird – can also be used in a static role. It can stay put on a chosen site for as long as that site continues to be the most suitable one. It doesn't have to be concreted in: and this saves money and man hours.

But if the unexpected happens – and in war it always does – Thunderbird can be away and in action again to meet a new threat overnight. It is operationally flexible. Now in service with the Army, its inherent mobility allows for quick changes in plan, easy resiting of defence and provides the versatility which is of ever increasing importance to present and future air defence.

EVOLUTION CONTINUES

An even more advanced version has been under development for some time and is well under way. Amongst other improvements, Thunderbird's successor will provide longer range and increased low-level capability whilst still retaining its full mobility and air-transportability. Evolution, in fact, is still going on – an evolution which, as in nature, will still further increase the versatility of the Thunderbird Weapon system, upon which our survival may depend.

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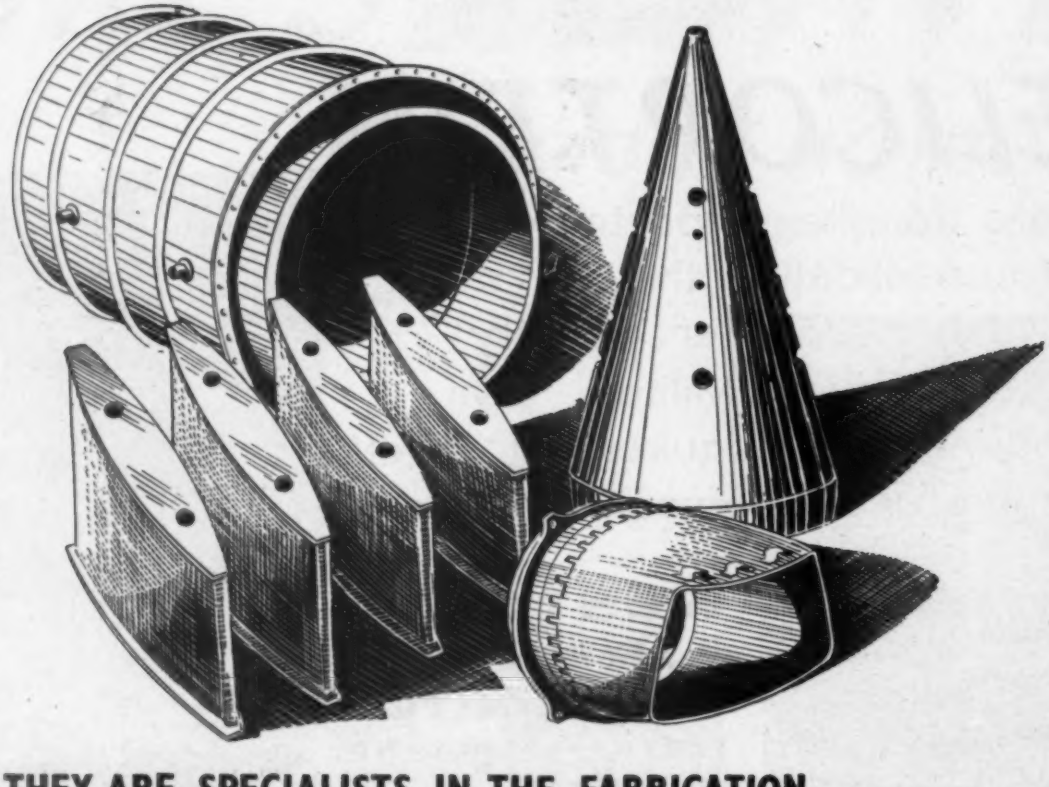

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JETS AB INITIO

Jet Provost T.3s in RAF Primary Basic Training

By HUMPHREY WYNN

IT says much for RAF faith in the forgiving and amenable qualities of their Hunting Jet Provost T. Mk 3s as primary/basic trainers that last week even a middle-aged journalist was allowed to try his hand, and brought an accompanying instructor safely back to earth.

The occasion was a visit arranged by Air Ministry to Syerston, where No 2 Flying Training School has since October had the first course to be taught to fly on Jet Provost 3s; and the writer's experience is perhaps worth relating in detail as a test of the claims which have been made for these aircraft.

In fairness it should be made clear that I am not a non-flyer, and so could not quite put myself into the position of the young pilot officers who come to Syerston with no previous acquaintance with aircraft. But my RAF flying, nearly 15 years ago now, was remote both in time and character from the jet world of today; nor could post-war RAFVR aviation, or piloting the Gemini which conveys *Flight* on such assignments as the Syerston invitation, really count as significant experience. Certainly as far as jets are concerned I was as much a new boy as members of an incoming course arriving at the school with their primped trilbies and pet mandolins plus youth's bright confidence in itself.

What might be called a small cross-country, from Church Fenton southwards to Syerston, provided my opportunity for Jet Provost 3 familiarization. I had been taken up to the Yorkshire station to see the AOC No 23 Group, AVM Colin Scragg, whose headquarters is responsible under Flying Training Command for nearly all the centres where RAF pilots are taught the rudiments of their trade. This visit was arranged through Syerston's station commander, Gp Capt G. Warner; and so that I could at the same time take in some Jet Provost 3 experience a taxi aircraft was kindly put at my disposal with Flt Lt L. A. Stapleton, of the headquarters squadron, as pilot-in-charge.

Only brief reference need be made to our northward journey, which I experienced entirely as a passenger; though two features are worthy of remark. One was the comforting stream of navigational information the modern pilot receives by radio. Flt Lt Stapleton turned on to "a northerly heading" (as he told control) after take-off, then we climbed through cloud from 1,000ft to 3,000ft. Thereafter, flying above eight-eighths, we received courses to steer every few minutes, directing us to Dishforth, where we had planned to do an instrument let-down.

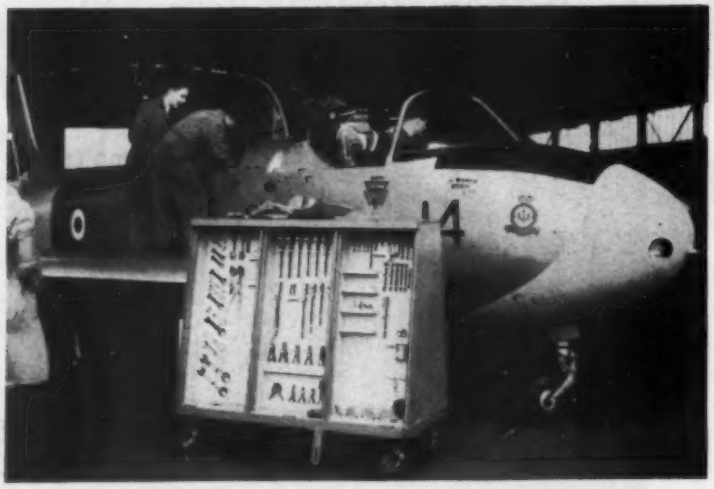
The second feature was that a little old-fashioned pilot-navigation is a useful weapon in the contemporary Service pilot's armoury. As the cloud thinned out, Flt Lt Stapleton decided to make a visual let-down before reaching Dishforth; and as it happened we found ourselves near Linton-on-Ouse, so followed that useful river to York and thence the railway line south-westwards to Church Fenton, at about 1,000ft.

When we left at midday to return to Syerston I sat in the left-hand seat and had control, under expert guidance, from start to shut-down. As this was the first jet aircraft I had flown, I compared the routine and performance at each step mentally with that of piston-engine types, and tried to align myself with the young officer who rides in a Jet Provost for his initial air experience.

With the introduction of these aircraft as basic trainers, the new pilot is indoctrinated from the start with certain aids and amenities unknown to his predecessors at a similar elementary stage. He sits initially on an ejection seat (Martin-Baker Mk 4P); he has UHF radio, Rebecca and DME in front of him; with a nosewheel undercarriage he is in flying attitude as soon as he enters the aircraft; and the absence of a propeller provides unrestricted visibility. Side-by-side seating is, of course, not new; presumably it has been found preferable to separate cockpits. I found in the Jet Provost 3 that there was ample elbow room for stick movements with two normal-sized people.

Once upon a time, all the pupil needed to do when he got into

Acting Plt Off D. J. Parker gets acquainted with the Jet Provost 3 cockpit layout in the emergencies trainer at No 2 FTS. In the heading picture: three of the school's aircraft being flown by instructors



(Extreme left) Ejection-seat training forms part of the course at Syerston, and here Acting Plt Off W. Mitchell is gaining experience on a Martin-Baker simulator

(Immediate left) Servicing at Syerston is on a fully centralized basis, and the composite mobile toolkit shows whether any tools are missing after maintenance

The Jet Provost 3's handsome rate of roll is suggested in this picture. The aircraft wear orange fluorescent paint—seen here as white

(Below, centre) A line-up of Jet Provost 3s on the school aircraft servicing platform

(Below, right) Airfield control at work, with the "jet clock," which records the height and time-of-flight of all aircraft, prominently in view; to its left is the chart showing the position of the aircraft in the circuit pattern

JETS AB INITIO . . .

a training aircraft was to clip on his Sutton harness and plug in his speaking-tube. Nowadays life is much more complicated, and I am generally amazed at the amount of plugging-in and fastening-up that has to be done. (Flying with the Fleet Air Arm involves even more basic routines, like donning a ventilated suit and immersion suit before you ever get near the aircraft.) But on this score again the Jet Provost 3 is a good teacher: the embryo RAF pilot gets used from the start to procedures he is likely to follow as long as jet flying continues.

At Church Fenton, as at Syerston before our initial take-off, I found I needed some assistance to ensure that everything was done up correctly. Basically, much is familiar: the quick-release box on what used to be the parachute harness (now, with the parachute embedded in the ejection seat, combined with the safety harness); plugging-in for oxygen supply and R/T. But there are unfamiliar additions: a safety clip on the release box; a small chain from the oxygen tube enabling it to be clipped onto the flying suit; leg-restraining straps; and straps which pass through triangular clips on the legs of the flying-suit and thence to the safety harness: in fact everything to retain a pilot in his aircraft during unusual attitudes, keep him communicado and breathing, and eject him safely if the worst comes to the worst. All this equipment, complicated at first sight, becomes second nature to a pilot brought up on it from the beginning.

Similarly, the instrument panel of the Jet Provost 3 has far more on it than a pupil has ever been asked to face before in basic training; but here again there is much that will be standard throughout his Service career, like the jet pipe temperature gauge, Machmeter and percentage power reading. To me, the most familiar feature was the blind flying panel, but even there a new look was given by the G.4 compass; and in course of time the ILS indicator may be accommodated on the panel.

Starting-up I found quite straightforward, at least with an experienced instructor by one's side, indicating which switches should be on. The actual starting is by push-button, so no more complicated than a car; and there is that curious lack of a physical sense of power which a propeller engine gives on starting. Throttle-opening is not required, and almost the first indication that the engine has started is given by instrument readings.

Taxying I found quite easy, once accustomed to use enough throttle to keep the aircraft going at a brisk pace, necessary when the highly efficient toe-brakes are used for turning. Speed is a new conception in taxying a training aircraft, which used to be a matter for slowness and caution. The parking-brake on the Jet Provost 3 is actuated independently from the toe-brakes: I found it very easy to apply when we got to the holding-point at the side of the runway.

Flaps are lowered for take-off to the position so marked on the control lever, which is at the pilot's left; and the engine is run up to full power before take-off, to check the instrument readings, with the aircraft lined-up on the runway and toes pressed hard on the brakes. Flt Lt Stapleton had warned me that "it takes quite a bit of holding."

I had never actually taken off an aircraft having a nosewheel undercarriage since wartime days of Bostons and Liberators, so that although the experience was not new it was reasonably unfamiliar. My instructor warned me that some brake was needed at first to keep the aircraft straight, and I found myself applying it on the port side; though as soon as full power takes effect there is no difficulty in keeping straight. Another piece of "gen" he gave me as we gathered speed along the runway was that the nosewheel was reluctant to rise at first, needing quite a sharp backward pull on the stick. But once the wheel is off, you hold the stick steady and the aircraft unsticks at about 80-85kt. Undercarriage retraction, by a push-button switch, is extraordinarily easy; and once we had gained safety speed and turned onto a southerly course for Syerston, I found the "JP" an eager aeroplane in the climb at 165kt. In fact, so pleasantly gratified was I with the feeling of that take-off that I temporarily omitted to trim progressively nose-heavy and found I had to exert considerable forward pressure on the control-column.

We were very soon in cloud, and I had to concentrate on instruments; but paradoxically, I found it rather more difficult to align myself when we broke through into the clear at just over 3,000ft, and Flt Lt Stapleton said this was a difficulty which confronts pupils. He said that the tiptanks (picked out in orange fluorescent paint, like the nose of the aircraft and the rear of the fuselage) often proved a helpful guide in determining the aircraft's attitude relative to the horizon.

On the way back to Syerston, once we had settled down at a cruising altitude of 3,500ft on approximately 70 per cent power (giving about 220kt), Flt Lt Stapleton was able to explain more about the cockpit layout and controls—the best way to receive such an explanation being while everything is "live." The fuel system seemed to be as simple and foolproof as possible: one main cock and the tiptanks (50 gal each) feeding automatically into the main wing tanks (186 gal total); one gauge giving readings for the tiptanks, another for the mains. The Bristol Siddeley Viper ASV.8 is similarly foolproof in that it reacts amenably to rough throttle handling and does not flame-out when required to give a sudden surge of power. In front of the left-hand seat is the UHF set, which with its 18 pre-set frequencies and 1,750 available ones represents an incredible advance on VHF. Not every airfield, of course, has yet the requisite ground installation to receive it. Church Fenton is not so equipped, and we were unable to call them on our visit. The Rebecca set in the Jet Provost 3 is opposite the right-hand seat and both pilots have a dial for DME.

During our return journey, as on the outward one, we received constant bearings from the tower at Syerston; but so busy was I asking questions and Flt Lt Stapleton answering them that we were suddenly told we had "gone over the top." At this point the cloud had broken up somewhat, so I throttled back and put out the air-brakes (which are immensely effective) before doing a diving turn to port. Below us was Syerston, and the slow thread of the Trent along its northern perimeter. We called downwind, checked three greens for landing-gear down, and I lowered flap to the take-off position. Flt Lt Stapleton advised me about when to turn from the downwind leg, but I was late on my final turn and had to corkscrew to line up on the runway. I remembered suddenly a comment some ex-piston pilot had made about his conversion: "Everything happens so much more quickly in jets."

However, I lined up eventually and we came in at a steady 110kt, decreasing to about 100kt over the boundary. I held off slightly too high, my instructor pushing the stick forward, but I kept engine on until we touched down and the landing seemed smooth. Another jet beginner had "made it."

* * *

At No 23 Group headquarters I had talked with AVM Scragg and with Gp Capt K. S. Batchelor, his Senior Air Staff Officer, about the implications of the entry of the Jet Provost T.3 into service with Flying Training Command. Their views put the aircraft into perspective both as to its past and future: the research done at Hullavington in 1955, when the production version Jet Provost was first tried out on pupils; and the eventual adoption of the more powerful aircraft with Bristol Siddeley Viper ASV.11 (2,500lb thrust as against 1,750lb for the ASV.8), giving more

JETS AB INITIO . . .

Flt Lt W. D. P. Jones, one of the instructors at No 2 FTS, gives his pupil—Acting Plt Off O. J. A. Knight of Uganda—some last-minute instructions

training time at 30,000ft and leading to the Gnat Trainer, with the gradual phasing-out of Vampires from RAF service. When this ASV.8—ASV.11—Gnat Trainer sequence will come to pass is not accurately predictable; but around the mid-1960s seems a possibility.

The higher background to the training pattern, touched on by the AOC and Gp Capt Batchelor in my short visit to Church Fenton, will be dealt with more fully in a future article about Flying Training Command and its changes. What these mean at present to No 2 Flying Training School was indicated in a briefing by Wg Cdr H. G. Davies, the CFI, during the visit which Air Ministry arranged to Syerston.

He pointed out, as I had found in my first-hand experience, that advances in aids and equipment had been built in to the Jet Provost—so that it contained, as standard, equipment which was "undreamt of years ago." Nevertheless, he considered this only a logical development of changes in RAF operational aircraft: "When you have a front line that is fully jet-equipped it seems foolish to start training people on non-jet types."

The CFI stressed that although jets were more expensive to operate than piston-engined trainers there were compensating economies. For example, the Jet Provost's greater climbing speed meant that exercises at altitude were started sooner and so completed more quickly; while its equipment indoctrinated pilots from the start with what they would be using subsequently in bombers or fighters.

In Wg Cdr Davies' view the idea that amounts of dual and solo flying should be equal was wrong; the right balance, he considered, was three hours dual to two solo—and this is approximated at Syerston, pupils doing 79hr dual and 41hr solo in their 8½ months' course. (The first Jet Provost T.3 trainees, who came to No 2 FTS in October 1959, are due to graduate on June 22.)

In a reference to ground training at Syerston, the CFI spoke with enthusiasm of the emergencies trainer ("not a flight simulator," he said, "in the sense that the airlines have one"), which enables all types of procedure for emergency situations to be inculcated at ground level. There is also a Martin-Baker test rig on which students can get experience of pulling the blind and being shot out of a cockpit. In the Ground School, where instruction on engines and systems is given, pictorial representations (made by Hunting Aircraft) light up to give the clearest possible mechanical indication of such operations as undercarriage lowering. The fuel system diagram is rotatable to show just what happens in the tanks and fuel lines when the Jet Provost is inverted.

By Wg Cdr Davies' side at his briefing was the OC Technical Wing, Wg Cdr A. Eyre, to speak of the maintenance implications of the Jet Provost 3s. He described the centralized servicing system which is in operation at Syerston and stressed its efficacy from the manpower point of view. He also had a few bouquets for the aircraft for their good serviceability record—"they have never been grounded since we had them last September"—and accessibility of parts for maintenance, for their good tyre behaviour (400 landings per set of main wheels) and general cleanness compared with their piston-engined predecessors.

At present, both piston-engined Provosts and T.3s are still operating from Syerston (though the last course on the former has officially just finished), so with two kinds of aircraft and several surrounding let-down patterns—such as Swinderby, Waddington, Langar, Fulbeck and Barkston Heath—air traffic control has a busy time, handling up to 1,000 movements a day. In the control tower, a check is kept on each aircraft's airborne time by the use of the "jet clock," an ingenious but simple device looking like a roulette board with spaces indicating hours and minutes.

At a typical 8 a.m. briefing, clear instructions were given for jet and piston-engined taxying patterns, circuit direction and other local procedures. This briefing included weather information and was as "operational" in character as possible. It was attended by the station commander, all officers concerned with flying activities, and the course pilots.

It seemed clear, even after only a short visit to Syerston, that No 2 FTS in being the first Jet Provost training unit is living well up to the historic traditions established by the school since it started at Duxford way back in 1920—long before the jet era which its latest graduates will shortly be qualified to enter. Gp Capt Warner who held a previous appointment at Syerston (1946-47) as a wing commander may well feel proud of his present command.

FOR THE BOOKSHELF

British Civil Aircraft, 1919-1959, Volume 1, by A. J. Jackson. Putnam and Co Ltd, 42 Great Russell Street, London, WC1. Price 63s. Illustrated.

IT would be interesting to establish the reasons why people buy books about aeroplanes as aeroplanes, and not in the context of their uses for particular purposes. Whatever the reasons, many people must be interested in such books and must be buying them in large numbers, in spite of their relatively high prices, because output has increased sharply in recent years. Generally speaking, the quality of these productions has been remarkably high, and highest amongst them—after Putnam's monumental "Bruce"—has been a more popular series from the same publisher. The first two of the Putnam series were by Owen Thetford—*Aircraft of the RAF, 1919-1959* and *British Naval Aircraft, 1912-1959*. That well-known historical authority on British civil aircraft, A. J. Jackson, has now produced a sequel under the title specified above. This is similar in appearance and format to the Thetford books but has proved so large that it has had to be broken down into two volumes, of which this is the first.

Whereas the Thetford books unambiguously describe and illustrate aircraft *types*—and do it extremely well, including brief outlines of each type's development and subsequent history—Mr Jackson has framed his treatment around individual aircraft of each type that have appeared at some time or other on the British civil register. This means that the text tends to concern itself mainly with the identities of individual British-built aircraft together with events in their careers, such as successive changes of ownership. The comings and goings of individual foreign aircraft which have been imported into this country are also followed most completely. In fact, there is no doubt that Mr Jackson caters for a more specialized readership than does Mr Thetford. Only a relatively small number of people can be sufficiently interested in obscure historic British civil aircraft to want to follow the careers of more than a few outstandingly famous examples of any particular type. This being so, it seems a pity Mr Jackson has not employed his unique collection of photographs and records of almost every aircraft which has ever appeared on the British civil register—this famous collection is, in fact, the basis of this book—for a more generally descriptive work which would have been of greater use for reference and might have appealed to a wider readership.

Be that as it may, people interested in the history of aviation will once again be grateful to Putnams for publishing this book and for thus making available the remarkable collection of material about British civil aircraft which Mr Jackson has collected for so many years. This collection also owes much—up to the time of his death in a flying accident in 1950—to the enthusiasm of the late E. J. Riding.

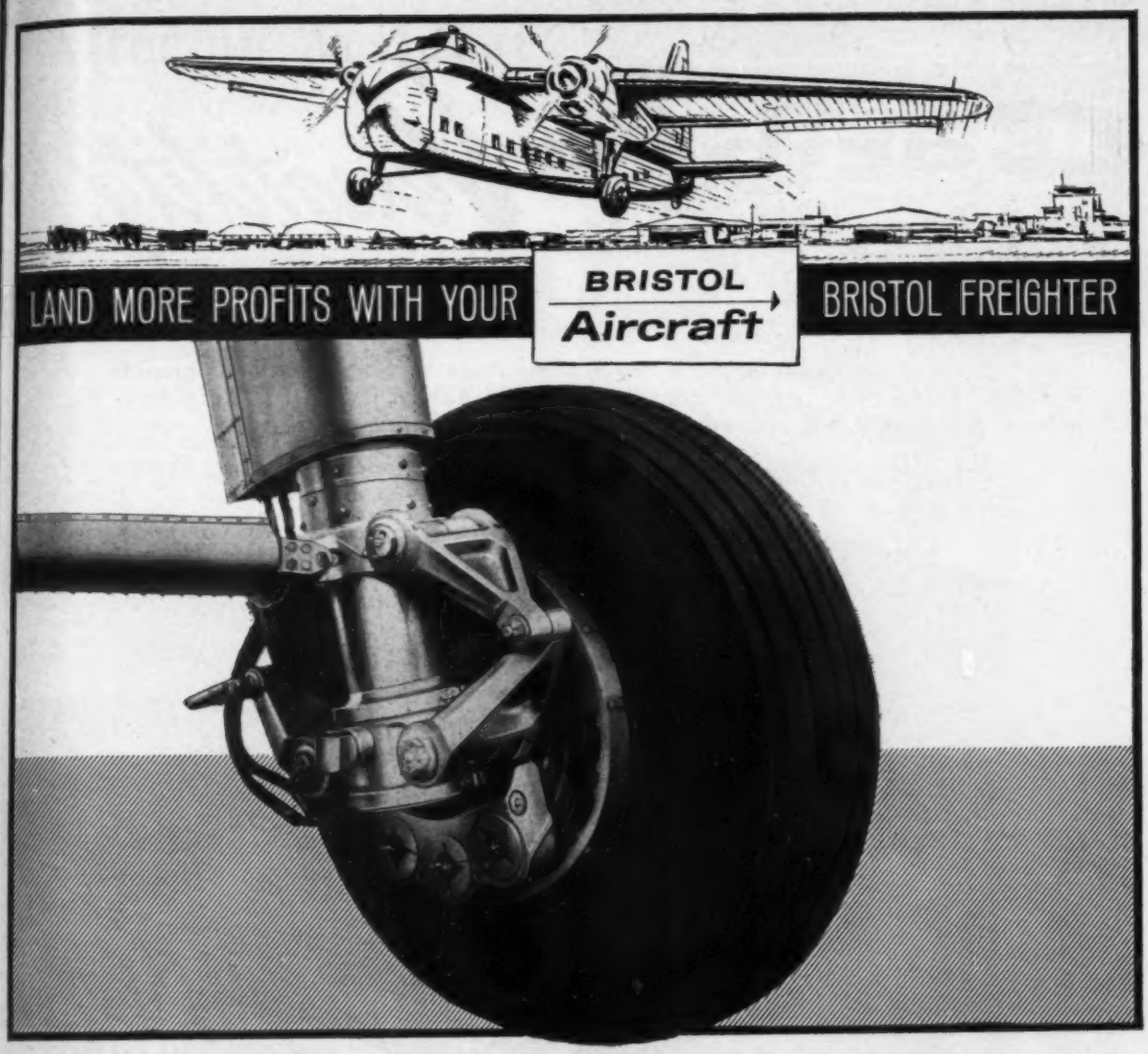
P.W.B.

Electronic Computers, Principles and Applications, by T. E. Ivall. Iliffe and Sons Ltd, Dorset House, Stamford Street, London, SE1. Price 25s. Illustrated.

THIS is a second edition of the book first published in 1956 dealing with the principles and applications of electronic computers. It has been largely rewritten to take account of the rapid developments since that time. In particular, the author has dealt in a new chapter with the evolution of the more "intelligent" machines of the future. The illustrations have been appropriately modernized and most of the diagrams replaced by new ones.

The book is a non-mathematical introduction to the principles and applications of computers employing valves, transistors and other electronic devices. The subject has deliberately been treated as generally as possible to provide a background of the whole field of computing. Some chapters are suitable for the interested layman but, in the main, the work appeals to technicians, engineers and students with some knowledge of electronics or electrical engineering.

Although the book deals mainly with the circuitry and construction of digital and analogue computers, it also discusses the increasing applications in industry, commerce and science for automation and industrial control and for research and design work. The author is joint assistant editor of *Wireless World*.



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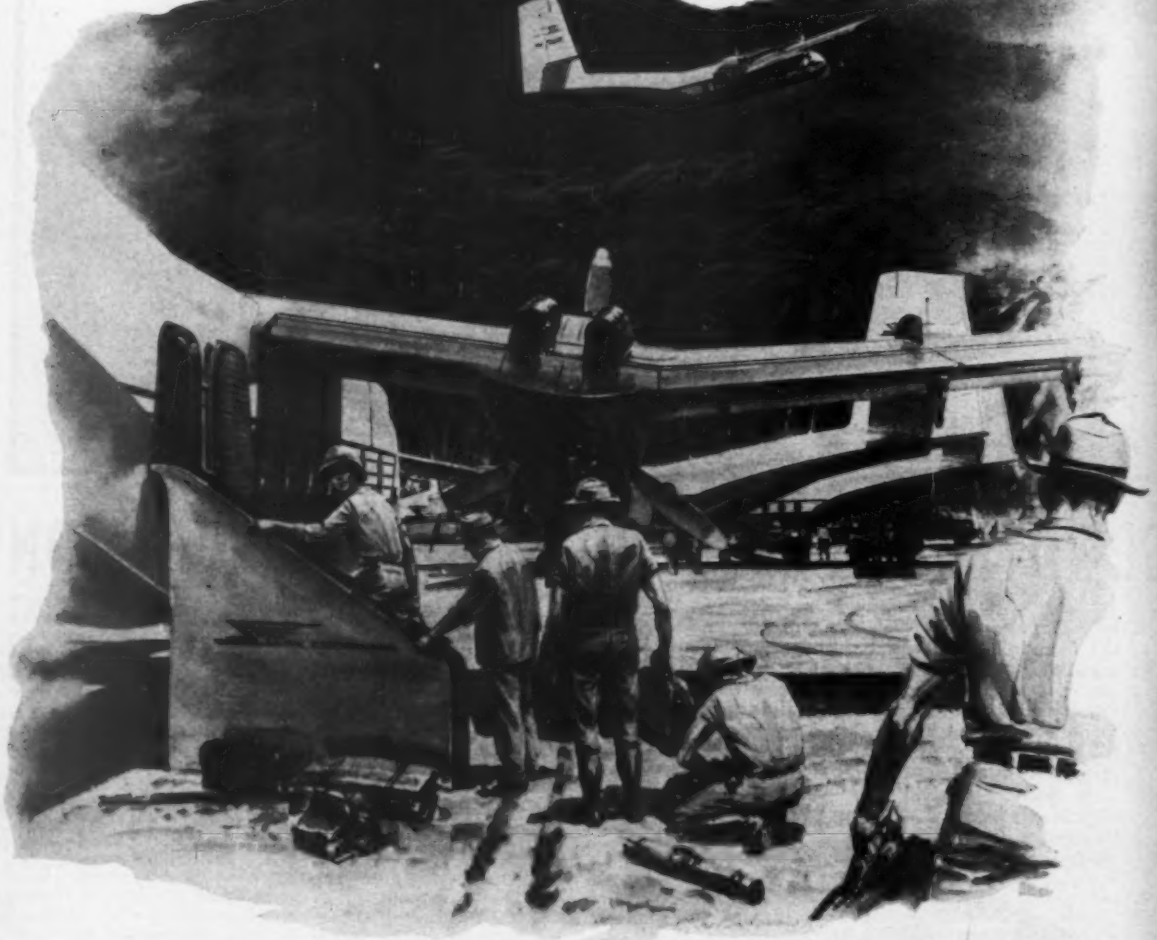

DE HAVILLAND AIRCRAFT OF CANADA

After an Accident

SHOULD THERE BE A NEW APPROACH TO INQUIRY PROCEDURE? A PILOT'S APPRAISAL

BY C. C. JACKSON

THERE is at present sitting a committee* under Sir David Cairns, QC, whose terms of reference are to advise upon civil air accident procedures and the application (one presumes mainly in respect of pilots) of licence suspension. To many in the industry this will be welcome: the procedures we currently employ have been evolved in an *ad hoc* way, and the feeling is widespread—especially among pilots—that blame and its associated social and economic penalties are not always fairly apportioned.

Aircraft designers have made great advances in air safety since the war (I am thinking mainly of two things: the ability of the aeroplane to fly efficiently after power loss, and its ability to carry a large fuel reserve), but unfortunately some phases remain critical, e.g., those of take-off and landing. This fact and the natural increase in the numbers of aircraft flying mean that accident headlines will still be with us for some time to come; indeed, we shall for a period be lucky to hold the line where it is. As each unexplained accident may give rise to one from a similar cause, and as reputations of individuals, companies and even governments are at stake, we may as well have inquiry procedures which are fair to them and are abreast in speed and technology with the industry with which they are dealing.

For this reason I hope that the proceedings of the Cairns Committee will not take as long as some of the other 27 governmental committees now in being, and that the recommendations will be acted upon with vigour; for, in my view, we could scarcely have a less appropriate system than we have now.

CAPTAIN JACKSON has been intimately concerned with inquiries into aircraft accidents since 1949, when he became technical secretary of the newly formed International Federation of Airline Pilots Associations. He was elected the Federation's executive secretary two years ago. In the 1939-45 war he served as a Bomber Command pilot, and until he joined IFALPA was a captain with BOAC.

Before entering upon an examination of the procedures of existing inspector's and public inquiries it is pertinent to relate them to other procedures applied to our daily life. In this we are fortunate in having a useful analogy in the administrative tribunal; we are even more fortunate in having a recent and widely accepted report on the functions and procedures of tribunals, namely the Franks Report.† The great thing in common between accident investigations and administrative tribunals is that, in the interests of the community, individuals or groups must vindicate their position if they are not to suffer loss, and they must do so by an agency other than a court of law. As, however, the recommendations of a tribunal may have the force of law, it is clear that the rights of the individual or the group are properly protected *only if the principles of law are behind the procedures of the tribunal.* This the Franks Report accepts, and it at once puts these principles down in these terms: *"When we regard our subject in this light, it is clear that there are certain general and closely linked characteristics which should mark these special procedures. We call these characteristics openness, fairness and impartiality."*

Bearing in mind the technicalities involved in aircraft accident investigations, I would add in their case some *emphasis on thoroughness.* In subsequent paragraphs I propose to show how these four principles are inadequately met by our present system and to point to methods by which they might be met.

The worst offender is, of course, the inspector's inquiry. This is held behind closed doors and it therefore makes no pretensions to openness. The procedures allow evidence to be taken by an arrangement under which witnesses attend at different times and have no right and often no opportunity for cross-questioning; hearsay evidence is permitted and in this way the parties concerned will not have knowledge of all the considerations being taken into account by the inspector. This is something rather more than unfairness; Star Chamber would be a more apt description.

With regard to the third requirement, impartiality, this is closely akin to fairness; however, perhaps it is a more appropriate word to use in relation to one aspect of inspector's inquiries—namely, the publication of the report. As with most tribunals, the parties immediately concerned are given an opportunity to see the report before it is published and to challenge any statement of fact. In the case of companies who may consider their interests prejudiced by the report, these have, I believe, sometimes been able to put this procedure to such effective use as to prevent the publication of the report altogether. To my knowledge there have been, in the past three years, five accidents to British aircraft on which reports have never been published. On the other hand, I do not know of a case where the responsibility for the accident has been placed solely at the door of the pilot and he has been able to change a word in the report—much less hold it up indefinitely. The reader will see now what I mean by impartiality.

In connection with the fourth requirement, thoroughness, this is obviously a need in both inspector's and public inquiries. The inspector's inquiry is not *ipso facto* less thorough than the public inquiry; but clearly the lack of opportunity to cross-question tends to set the inquiry into a particular groove at an early stage and this may well be to the entire neglect of other possible avenues.

On the basis of the four criteria I have postulated, therefore, the inspector's inquiry shows up poorly. This is not a reflection on the individuals concerned; it is a reflection on the system under which they have been asked to serve. This system grew up when accidents to public transport aircraft were usually elementary affairs; only one manufacturer was concerned, the engineering aspects were simple, no air traffic control was involved and the number of personnel killed or injured were few. On the face of it, it looked a cheap and quick method of arriving at the causes of the accident and for setting in train remedial measures to prevent a recurrence. These features, however, now no longer obtain; and, as indicated above, the procedures are so removed from those applied elsewhere in civil life that minor adjustment is not applicable. The only appropriate course to take is to abolish the inspector's inquiry and to accomplish its objectives by other means.

The other method of accident investigation—the public inquiry—is not open to the same charges of third-rate justice as is the inspector's inquiry. It is, however, not without grave faults. In the first place it is too elaborate, too much of a show-piece, too slow and too expensive. Justice must of course be paid for; but in order to find out the cause of an air accident is it really essential that each party deeming itself affected should have to begin by putting a solicitor through an education in aerodynamics, aero engines, aircraft structures, rules of the air, air traffic control, licensing requirements, meteorology and aircraft communications, so that the solicitor can brief a barrister in these subjects, so that he in turn can reveal the technological

The public inquiry, says the author, "is too elaborate, too much of a show-piece, too slow and too expensive"

**The members of the committee are: Sir David Cairns, QC, chairman; Sir Frederick Tymms, KCIE, MC, FRAeS; W. L. Heywood, CBE; Peter Masefield, MA(Eng), FRAeS; H. C. I. Rogers, MA, MIMechE [see "Accident Investigations Investigated," "Flight," October 2, 1959].*

†Report of the Committee on Administrative Tribunals and Enquiries.

After an Accident . . .

light to a layman president of the court who will often be sitting in that capacity for the first time? Yet there must be few inquiries whose relevant facts could not be spotted in a day and sifted in a week under experienced direction. Instead of the court taking its pace from counsel, as it does today, it should take it from its president, which under the existing system it cannot do. That is the first point on which reform is needed, and this will be dealt with in Recommendation 2.

The second weakness stems from the first: this is the slavish emulation of the proceedings of the High Court: Certificates of Airworthiness, load sheets, crew and engineers' licences, log books, and so on, are all exhibited and proved in legal fashion. The same time would be taken up with these procedures after a mid-air collision—in which the relevance was slight—as would be applied in a case involving engine failure, in which the relevance is very much greater. Someone, of course, must check on such documents in all cases. But does it have to be done by a court of a hundred highly paid men? A solution is offered in Recommendation 1.

The third weakness of the public inquiry is, in my view, more important in that it can affect the findings. Again it stems from the unfamiliarity of the president with the make-up of the industry. I refer to the fact that, when aircraft performance has been in question, the court has never called for a performance test. Examples of this are the Viking at Blackbushe on May 1, 1957; the Viking at Southall on September 2, 1958; and the York in Malta on February 18, 1956 (the latter inquiry under the Government of Malta, but following UK procedures). In all these cases the evidence of the Air Registration Board has been accepted by the court without any form of cross-check.

ARB Evidence

Now I have no quarrel with the ARB in this. But I cannot possibly regard the Board as entirely independent witnesses in the matter of aeroplane performance. After all, they recommended the granting of the Certificate of Airworthiness; during performance tests overload gradients are not measured; and during a long life aerodynamic efficiency falls off. Yet the ARB official, quoting a theoretical figure, is never required to prove it. The certification of aircraft performance is carried out as something of a secret act as between the manufacturer and the ARB. At no point does the ordinary pilot get an opportunity to see just how the check is carried out. Yet in spite of this secrecy it is common knowledge among pilots that the techniques used in measuring performance are extreme (especially is the case of landing) and cannot be applied in day-to-day operations. This being so, the pilot cannot use the certificated figures for his yardstick in many cases and he therefore tends—quite reasonably—to place his faith in the thought that, if there is an accident, the court will see that these performance figures are substantiated. But the court never does!

I have given above my main criticisms of the two types of inquiry. But before proceeding to the remedies we may appropriately consider the position of the pilot, who is so often the central figure.

Suspended Pilots

After the accident a commercial pilot is normally suspended from further flying until after the result of the inquiry. Although this would seem to be a prudent measure, it is not necessarily a just one, since the cause of the accident may have had nothing to do with the pilot, who may suffer financially by reason of his suspension. But notwithstanding the above, suspension seems the only practical course to take. The possible injustice it does, however, lends emphasis to the need to conduct inquiries as quickly as possible.

But if it is impracticable to avoid temporary suspension, it is not necessary to impose a further restraint on the pilot, namely access to all the evidence he can secure. Yet in the UK the pilot or his representative is denied access to the scene of the accident. Everybody else seems to go there (the operator, the manufacturers of the aircraft and of the engine, and often of ancillary equipment) to obtain first-hand evidence which may be of assistance to them in defending their reputation. Clearly, therefore, the pilot should be afforded the same facilities in defending his reputation.

Turning now to the remedies, I propose here to give only the outlines, since it would take a great deal of space to work right through all the ramifications involved:—

(1) I would recommend the abolition of inspector's inquiries and the employment of the present staff as "agents of the court" to the public inquiries.

(2) All accidents should be subjected to a public court of inquiry comprising: (a) A president, who should be selected from a panel of eminent lawyers; (b) A vice-president, similarly qualified, whose duties would be to act as personal assistant to the president and, in this capacity, to gain experience for a later appointment as president; (c) Two assessors (more in cases of special complexity), drawn from a separate panel, representing various professional bodies—e.g., pilots, engineers, air traffic controllers. One assessor should normally be a practising pilot.

(3) The court should be appointed by the Lord Chancellor and not by the Minister of Aviation, whose department may be directly involved.

(4) In cases where blame is attached to an individual or to individuals, an Appeals Board should conduct a further hearing. The Board should be drawn from three members of the presidents' panel, at least two of whom should have previously sat as president. These members of the Board should be appointed permanently. Assessors should be co-opted by the Board according to the grounds of the appeal. The role of the assessor is slightly diminished on the Appeals Board. The reason for this is that, in the sort of case taken to appeal, the judicial element should predominate over the expert.

(5) Any party to whom blame might be attached should have the right to be represented by a legal adviser, a trade union official, or a friend. However, the tradition should be established that it would be exceptional for legal advisers to attend. If they did so, they would be given no special position *vis-à-vis* any other adviser; moreover, in such cases due notice should be given to all parties, so that others could decide whether or not they should be legally represented.

(6) The usual rules of evidence should in general govern the proceedings, but they need not be too rigidly applied. Hearsay evidence should definitely be excluded, but the proceedings should, nevertheless, not be too formal. On this the Franks Report probably strikes the right note: "*The aim should generally be to combine an orderly procedure with an informal atmosphere. . . . Parties should be free to question witnesses directly and not only through the chairman.*"

(7) Parties to whom blame is attached in the findings of the court, and advisers to those parties, should have the right to see the findings before publication and to raise any question of fact. This is in line with the recommendations of the Franks Report. They should, however, not have the right to hold up publication indefinitely even though all the facts may not be ascertainable.

(8) A suitable system should be devised, in association with the appropriate professional bodies, for a number of "approved pilot observers" to be appointed. These should be pilots of proven experience. Arrangements should be made for them to have a brief course in the principles of accident investigation. They should then be permitted to attend all "on-the-scene" phases of inquiries.

(9) The principles outlined above should also be applied, so far as practicable, in the case of foreign inquiries. In particular, the right to withhold evidence at any point should not be permitted; evidence should, indeed, be volunteered. In this connection, it may be necessary to give the agents of the court authority to obtain evidence from a manufacturer or operator and to transmit it to a foreign court of inquiry. Only by such means can confidence be placed in the reciprocal arrangements outlined in ICAO Annex 13, para. 5.1, and only by such means can a British national, falling under a foreign court of inquiry, enjoy as great a proportion as is practical of the rights to which he would be entitled in the United Kingdom.

Time for Reappraisal

Finally, it may not be inappropriate here to comment on the general setting in which aircraft accident inquiries take place. Because of the small circle among whom adequate knowledge exists, as compared with the case of railway or road accidents, there is a tendency for the inquiry to assume a unique character. The discussions are a hunting ground for the specialist, and there is a tendency, from the Government downwards, to assume the responsibility of "protecting the industry." By this it is hoped to minimize public alarm and thereby to maintain the prosperity of the industry. This is all very well, but this policy can be applied only at the expense of the individual or at the expense of not publicizing the error (and thereby inviting a recurrence). While the industry was growing up—in, say, 1925-45—it was difficult to strike a balance. Civil flying tended to be regarded on much the same basis as military flying: there were known risks but one played them down, as one does the casualties of military engagements.

I would say, however, that we have now passed that stage. There is a very large, adult and sophisticated industry. Moreover, there are some very good aeroplanes and operations; the risks are within our day-to-day experience in other walks of life. Therefore, whatever justification there might have been in the past for the protection of a young industry, this no longer applies and the privilege which the industry has hitherto enjoyed should be more closely regulated and brought into equality with the privilege of the individual. It must face its disasters just as it is free to profit by its triumphs. It should therefore be prepared, in the event of an accident, to "see the chips on the table."

But, to put the matter in perspective, I should say that the position on accident investigations in the United Kingdom is no worse than in many other countries. It is fairly common to find inadequate inquiries, safeguarded commercial interests, a playing-down of facts which might lead to criticism of the aeronautical authorities, or the entire suppression of reports. However, in the leading aeronautical countries of the world this phase is rapidly being discarded, and it is timely for the United Kingdom to make its reappraisal and so prevent the interests of a small but important group from slipping under the cloak of a technocracy which lacks the checks and balances applied in other fields of our public life.

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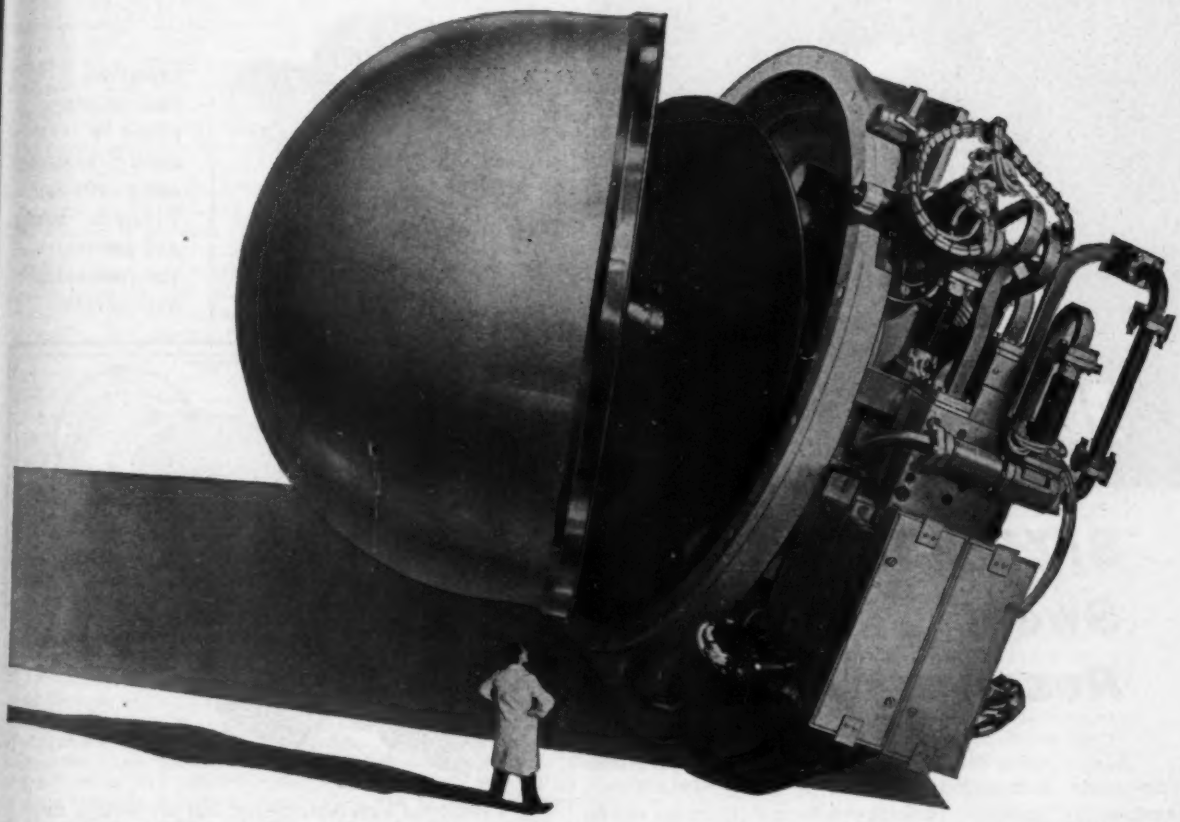

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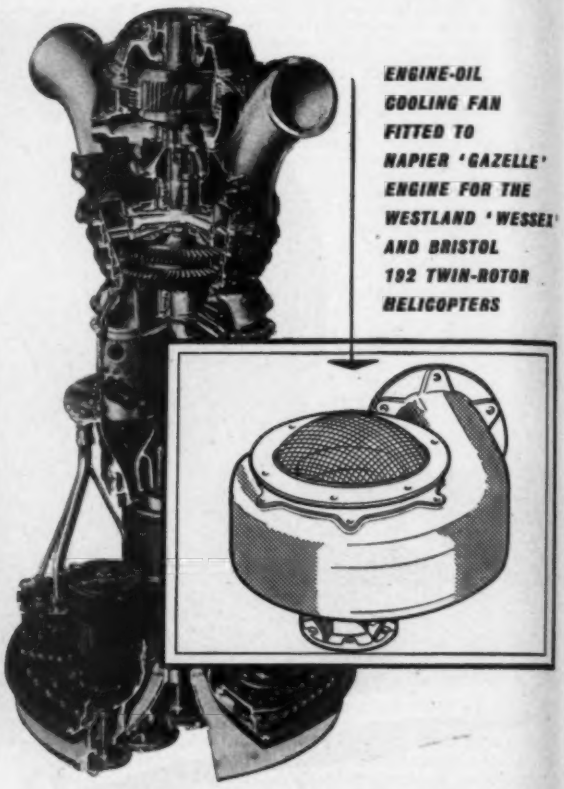

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Straight and Level

WHAT a pleasant word is polyonymy—with all the lilt of *Sweet Polly Oliver*. But there is nothing pleasant about it in my present context.

I am thinking of the Convair 880. It started life as the Skylark—a lovely name for a lovely aeroplane. Then Convair muscled in on Boeing's numbers racket and put around the designation Model 22 (also rendered as 22/31). Howard Hughes decided to lash out with a bit of Hollywood glamour; so overnight it became Golden Arrow. Soon the glamour began to wear thin, and from then on it was Convair 880 (with one or two plain and fancy suffixes, such as 880/M and 880/22M). Beefed, stretched and shock-bodied, this long-suffering aeroplane became Convair 600 (Model 30)—the "600," it is said, connoting that number of m.p.h. But having bought some, American Airlines decided that passengers would take a poor view of "600" after "880." So their Convair 600s are to become Convair 990s.

Any more for the Skylark?

● According to a space-minded weekly published in Washington, "the French may now try to speed up the IRBM program by using a de Havilland Blue Streak as the first stage and developing their own second stage."

This certainly would speed up their IRBM, because Blue Streak has twice the range of an IRBM to start with.

● Apparently whenever any Government-sponsored programme costs more than people thought it would—as it always does—Opposition back-benchers rally to the attack with a cry of "Wanton waste!" One MP recently calculated that the waste involved in developing three British guided weapons (see *Flight*, March 11, page 331) would give every old-age pensioner 10s a week extra for six months. He asked whether it was right that no action should be taken.

I should like to ask him what action he suggests ought to be taken. When one starts to do something quite new one can make the most woefully inaccurate estimates of how things will go—especially if, as in the case of the three missile contractors, one does not wish to scare off the customer by pricing everything too highly.

The obvious solution is to operate missile R & D contracts on a fixed-price basis, agreed in writing beforehand. Then we may get some realistic estimates. But the hubbub is about something that happened a dozen years ago, when nobody in the world knew how much missile development really cost, apart from a few hundred Germans.

● Anyone who served in or near Naples during or shortly after World War 2 will remember with rueful admiration the calibre of the local thieves. It is recorded that they once stole a complete loaded Liberty ship. Now, I hear, the Italian police are trying to trace a stolen Italian air force F-84F.

I wonder what will happen to it? The Machmeter might reappear on an Alfa Romeo Giulietta Sprint Veloce Spyder. On the other hand, the complete aircraft might be enlisted in a nasty unfriendly air force. Or perhaps the thieves are using it as a high-speed smuggler, finding the Liberty ship a bit too slow?

● "[The supersonic airliner] is an opportunity to make the whole game more unstable and more ruinous than ever before. We must get this aeroplane right at the right time. What you can do depends upon what you are *capable* of doing, not on what you think that someone else is going to do. If the British keep within their capabilities they can make a better aeroplane within those capabilities than the Americans or the Russians. But if we don't, we shall fall flat on our face. *This* is the test of our responsibility."—*Sir George Edwards, opening the discussion of M. B. Morgan's recent paper on supersonic aircraft.*

● The following story is true. Only the name of the airline and the flight number have been changed to protect the innocent:—

A Boeing 707 stood poised for take-off on the end of Idlewild's runway. The 97 passengers were greeted by a cordial voice over the passenger address system:

"Good morning, ladies and gentlemen. This is the captain speaking. I would like to welcome you aboard Federal Airlines' Flight 200 for Los Angeles. We will be cruising today at an altitude of approximately 34,000ft and the weather will be clear and smooth. Our route will take us over Chicago and Denver. We have a fine steak dinner planned for you with a cocktail by courtesy of Federal Airlines . . ."

The captain then switched off the p.a. system—or so he thought. The passengers then heard him remark:

"Yeah, Frank, we'll give 'em all that junk if I can just get this big fat monster into the air."

● You've probably heard about the Camel that passed, not through the eye of a needle, but anyway under the Forth Bridge. You'll remember, too, the Auster that used to come up to London for bridge parties. And perhaps you've read about the B-47 that went underneath the arches spanning the Strait of Mackinac. . . . But what deed of derring-do is enacted in my picture? Can it be that Santos Dumont himself was first to fly *sous le pont?* (actually the aqueduct at St Cloud). Can this frail craft be the prototype archetype?

I am sorry that I cannot record that it is. But just a few days after this picture was taken the dashing little Brazilian conducted this same "steerable balloon" round the Eiffel Tower—by far the most significant feat of aerial navigation up to that time, and one that sent Paris wild with joy. The date was October 19, 1901.

● One of my *Flight* colleagues the other day received a telephone call from a man who said that he wanted to buy a six-seat aeroplane. Upon being pressed for a more detailed spec. the caller said: "Haven't a clue, old boy—just don't know how to set about it." Perhaps, I thought later, the USAF could have sold him a surplus B-52.

● Over 30 years ago—on January 1, 1929—the US Army Air Corps' Fokker Trimotor *Question Mark* took off from Los Angeles. It landed seven days later, having been flight-refuelled by a single-engined Douglas biplane. Among the *Question Mark's* crew were Maj Carl Spaatz, Capt Ira C. Eaker, and Lt Elwood R. Quesada.

At a reunion the other week the epic flight was recalled by Gen Carl ("Tooey") Spaatz (Ret), first USAF Chief of Staff (1947-48); Gen Ira Eaker (Ret), USAF Chief in the European theatre during World War 2 and now a Douglas Aircraft vice-president; and Lt-Gen Elwood ("Pete") Quesada, Commander of the 9th Tactical Air Forces in World War 2 and now top man in US federal aviation as Administrator of the FAA.

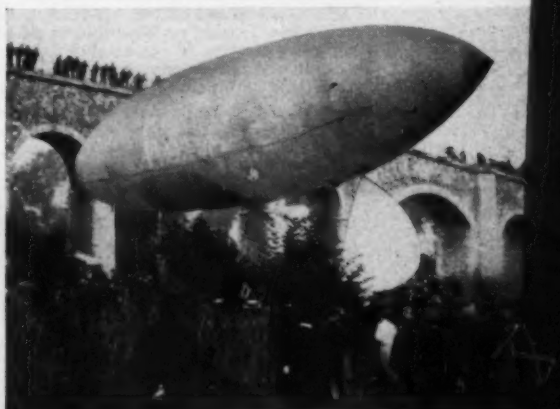
It looks as though someone in the Air Corps personnel branch during the '20s was a pretty good picker.

So There

● "We have always maintained that if anyone carried a single person across the Atlantic it ought to be us, not BOAC." —*Sir John Brocklebank, chairman of Cunard.*

ROGER BACON

Santos Dumont's bridge party (*see left*)



Pictured here at Blackbushe Airport are three current models in the Cessna range. From the left, Models 175, 150 and 210. The Cessna agents in this country, Airwork Services Ltd, are now demonstrating these attractive machines

Sport and Business

THE ROYAL AERO CLUB is paying increasing attention to "the growing business-aircraft section of general aviation." In his chairman's report to the a.g.m. of the club on March 23, Col C. F. H. Gough reported that "we are taking active steps to set up facilities to help and advise operators and potential operators of business aircraft; we are convinced that there will be a great expansion in this sphere in the immediate future." The report stated that the number of full members of the club was 2,360 at the end of 1959, of whom 696 were overseas members; and the number of associate members was 1,833.

After mentioning the work of the Standing Joint Committee on Private and Club Flying and Gliding, the report continued: "It was hoped that the new Minister of Aviation would make an early statement as to his intentions for general aviation and, although he has made himself clear in respect of the industry and air transport, so far, to our disappointment, he has made no statement as to his policy toward general aviation."

Following the official part of the meeting, Philip Wills described the work of the Shaw Slingsby Trust (in relation to the presumed forthcoming end of the Kemsley Flying Trust). Lord Brabazon, RAeC president, presented the club's Silver Medal to Maj T. W. Wil'ans and the Geoffrey de Havilland Trophy to W. R. Gellatly, and made a token presentation of the Britannia Trophy to Sqn Ldr Peter Latham on behalf of 111 Squadron, RAF. Prof J. A. J. Bennett, recipient of the Bréguet Memorial Trophy, was prevented by illness from attending.

FREE FLYING SCHOLARSHIPS up to PPL standard are again being offered by the Air Schools organization, operators of the Midland School of Flying at Derby and the London School of Flying (incorporating Elstree Air Centre) at Elstree. The LSF at Elstree was formed recently to take over the flying activities of Elstree Flying Club. Applicants for scholarships must be over 17 years of age and must undergo four hours' Chipmunk instruction (or five hours in an Auster) at their own expense. This money will be refunded to the successful applicants, who will be chosen on the basis of aptitude, enthusiasm, punctuality and effort.

AN OPEN DAY at Ipswich Airport is being organized by East Anglian Flying Club on May 22. Visiting pilots and aircraft will be welcome, and it will assist the club if intending visitors give advance notice of the number of lunches required. At the club's recent annual general meeting Nick Upsdale was elected chairman and Mrs Jill Parsons secretary. The two instructors, Frank Taylor and Stan Ward, reported that a record total of 785 hours had been flown during 1959. The club comprised 81 flying members and 204 social members.

LEINSTER AERO CLUB is holding its annual display at Weston Aerodrome, Leixlip, on Whit Sunday and Monday, June 5 and 6. The club is trying to organize an international air rally for the occasion and has already arranged for about 12 aircraft from the Netherlands to participate and a similar number of French machines from St Yan. It hopes for further acceptances from Germany, Belgium and other countries.

NEW CHIEF FLYING INSTRUCTOR of the Armstrong Siddeley Flying Club is John Hill, following the resignation of Harold Ashworth for private business reasons. Mr Ashworth will continue as an instructor to the club at Baginton.

A WORLD AEROBATIC CHAMPIONSHIP will be organized by the Czechslovak Aero Club during the period August 28-September 4. The meeting is being held under the auspices of the Fédération Aéronautique Internationale.

NO SUBSIDY is being paid by the South African Government for private flying during the 1960-61 year, although recently the Minister of Transport said that one would be paid and the Aero Club had been told unofficially that it would be £20,000. The Club wanted £30,000 a year, compared with one of £20,000 p.a. which expired a year ago. This subsidy, which operated from 1954-59, resulted in an increase in the number of flying schools from seven to 23 and the building of 40 new airfields, mostly in rural areas.

FIRST DELIVERIES of the new Piper Aztec executive twin were made during February. Forty-three were delivered at a basic price of $49,000 each.

WAVE-FLYING in the Helm wind over the Pennines has been carried out recently by members of the RAF Gliding and Soaring Association under Gp Capt N. W. Kearon, deputy chairman of the Association. Member-clubs logged 39,911 launches, 5,332 hours' flying and 13,895 cross-country miles during 1959, and an even more active year is forecast for 1960. RAF inter-command team and individual contests, and the inter-Services championships, will be held during July at Odiham, Hants.

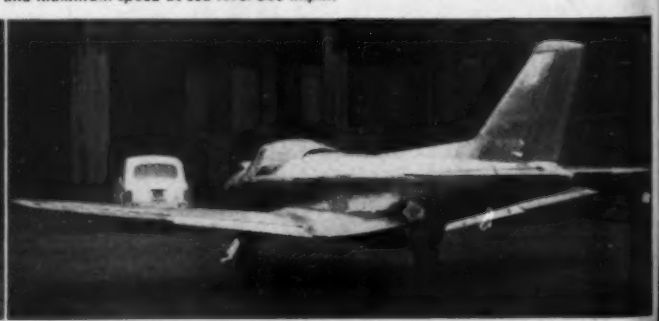
AMONG AUSTRALIAN GLIDER PILOTS who have recently obtained Silver C certificates are two who first flew solo in 1956 at the respective ages of 12 and 11 years. They are John Rowe and Ronald Brock, both of the Waikerie Gliding Club.

RETROSPECT

From "Flight" of April 2, 1910

H.M. the King at Biarritz: Despite the counter attractions at Cannes and Marseilles, the Biarritz meeting opened in brilliant fashion on Tuesday last, and King Edward paid a visit to the ground during the afternoon. Just previous to the arrival of the Royal party Chavez attempted to fly but owing to an error in steering he crashed into a tree and smashed his Farman machine. Leblanc, however, made several flights on his Blériot monoplane, and at His Majesty's request M. Blériot also flew round the ground. Subsequently Capt Burgeat, under his bird-name of Georges Bailly, flew a complete circuit of the aerodrome, but smashed his Antionette machine in landing.

Two views of the Italian Neeff F.400 Cobra, a two-seat touring and training aircraft powered by a Turboméca Marboré turbojet. Span is 28ft 7in, gross weight 2,870lb and maximum speed at sea level 360 m.p.h.



Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

"Fire-reluctant" Hydraulic Fluid

From Sir Miles Thomas, chairman, Monsanto Chemicals Ltd

YOUR March 18 issue has caught up with me in New York. I note with interest that you attached a footnote to my letter on hydraulic fluids for aircraft.

Being not unfamiliar with the duties and virtues of air corporation spokesmen, it does not surprise me that no "prima facie" evidence is available concerning the burn-out of the Viscount that snagged its nosewheel assembly in London.

If the fire was not caused by combustion of mineral hydraulic fluid, what was the cause? Obviously it was a "hot" fire. The remains of the fuselage testify to that.

But the seriousness of the situation surely lies in the fact that the head of the Air Registration Board was apparently unadvised of the availability—and, indeed, the use on aircraft such as the D.H.121, the Boeing 707, the Douglas DC-8, and the TCA Vanguard—of non-mineral fire-reluctant fluid. Surely this availability should be more widely known and its adoption more widely encouraged.

New York — MILES THOMAS

REFERENCE the letter on hydraulic fluid from Sir Miles Thomas in your issue of March 18, I would like to cross swords with him and stand by the assertions made by Lord Brabazon in his recent speech to the Guild of Airline Pilots and Air Navigators.

It seems that Sir Miles will insist that Skydrol 500A hydraulic fluid is non-inflammable. This is not so. It will burn quite well as a lamp wick oil. It gives off a black smoke which, I believe, is toxic. However, Skydrol is less inflammable than DTD.585 hydraulic fluid and the use of Skydrol fluid in a hydraulic system in preference to DTD.585 will certainly reduce the fire hazard where such hazard is entirely due to spilled hydraulic fluid. Though Skydrol is claimed by Sir Miles to be non-inflammable I would prefer to say it is "fire-resistant," as he himself says in a later paragraph in his letter.

It is interesting to note that no insurance company has ever considered the use of Skydrol as a case for reduction in premiums.

In any aircraft accident where the fuel tanks are ruptured the contribution to fire hazard from the limited amount of hydraulic fluid available must be negligible. The only non-inflammable hydraulic fluids known to me are the water/glycol-based fluids. However, very little is known about these yet, since they are still under development.

I myself would dearly like to see the introduction of an efficient-under-all-conditions, truly non-inflammable hydraulic fluid in service, especially on aircraft.

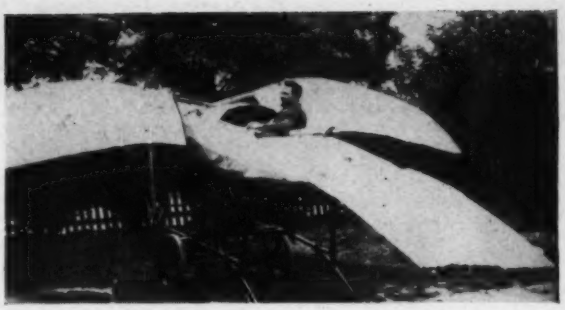
Laleham-on-Thames, Middx — R. M. BRADLEY (Development engineer, aircraft)

Aviation in Antarctica

THE reader of "Antarctic Promise" (*Flight*, December 18, 1959) would be pardoned were he to assume that the staging of commercial flights through Antarctica will shortly take place. Unfortunately, it is evident that the author has been seriously misled. Aside from the fact that the volume of current and potential passenger exchange between Australia, South Africa and South America is so small that the construction of a normal *en route* airfield could not be justified, the cost and problems of Antarctic construction of airfields, navigation aids and communications—to civil or military standards—beggars description.

In any language, "6,000,000 square miles" of ice is a lot of ice, particularly when its average thickness is in the order of 6,000ft. (The 48 states of Continental USA total 3,022,387 square miles.) I draw this comparison to help get a perspective of this ice mass which, some years ago, calved one iceberg measured by an astonished ship's captain as "over 100 miles long." Mr Scholes is aware of these matters, of course, but his information on present airfields in Antarctica suitable for commercial use is widely astray, as are other aspects of his article.

Of the three airfields quoted as "suitable for commercial use," that at McMurdo Sound is on sea ice and subject to disappearing (in pieces) to the north, during the summer, as it did in March 1958; when the airfield is "in," operations are restricted to October and November. Mirny is used for aircraft up to and including the Russian equivalents of DC-3 and Convair, basically on skis. At Wilkes there is no airfield, nor is an ice airfield of adequate strength feasible. Neither has action been taken to have either RAAF Airfield Construction Squadron construct a ski-way, nor has any other organization been instructed so to do.



H. B. Passat's 1920 ornithopter (see letter below)

Rear Admiral Tyree, USN commander of "Deep Freeze 5," was quoted on February 26 as saying that the Marble Point airfield proposal is feasible. However, the cost could be several hundred million dollars (not "£20,000,000"), the construction time being seven years. (The US vacated two Antarctic bases in 1959 on the grounds of economy, following a $23,000,000 budget in 1958.)

It is not clear why Australia should have competed with the Russian and American Antarctic air programmes just because an Australian national, Sir Hubert Wilkins, was the first man to fly in Antarctica. While Australians are justifiably proud of the late Sir Hubert's pioneering, it should be remembered that he was flying American aircraft as a member of an American expedition. He was, in fact, a long time resident of the USA, acting in an advisory capacity up to his death last year.

Three last points. The "Australian parliamentary party [sent] to Antarctica to survey airfields" did not set out to, nor did it in practice, survey airfields; the Perth - Kerguelen - Johannesburg route proposed by Mr Scholes does not run along latitude 50°S but 32°S-49°S-26°S. As to the "prospects that Antarctica will be colonized for its mineral and oil reserves," I am authoritatively assured that, as far as is known, there are no oil reserves nor, other than coal, mineral reserves.

These criticisms are intended to be constructive; the refutation of inaccuracies stemming from a semi-official authoritative source such as *Flight* is essential if the vast problems inherent in Antarctic air operations are to be first, clearly appreciated and second, resolved—as resolved they will be in the course of time. We will not, however, see "commercial air services across and to Antarctica . . . in a few years . . ."

Canberra, Australia — D. R. BEATTIE, Wg Cdr, RAAF

Ornithopter Experiments in Britain

I ENCLOSE a photograph taken in 1920, and not hitherto published, showing an ornithopter which I hoped would lift almost vertically. It failed. The engine was an ABC twin of 10 h.p., and whenever the flapping motion exceeded 120 strokes per minute one of the wings broke.

I cannot, unfortunately, show you a photograph of the ornithopter with which I flew on Wimbledon Common just before the First World War. This had a two-cylinder Werner engine of 4½ h.p. Owing to lack of control I collided with a tree, which stopped my flight and most probably saved my life. The photographs of this machine were destroyed when my house was bombed during the last war.

Should any readers wish to ask me any questions on how to win the £5,000 Kremer prize [for man-powered flight] I shall be glad to help them in so far as I am able.

London SW20 — H. B. PASSAT

Early Aluminium Cylinders

I NOTED with great interest the illustration of the Viale five-cylinder engine on page 196 of your issue of February 12. As far as I can make out, after considerable investigation, the origin of the use of aluminium as an air-cooled cylinder material traces back to Viale in 1911. Personal correspondence with him indicates that the attempt was not successful since, as he said, "he did not have the sense to think of valve seat inserts." While Viale's work was not successful I think there is no doubt that it inspired the work at the Royal Aircraft Factory which started late in 1915 at the suggestion of H. P. Boot. I think there is no question that the work on aluminium air-cooled cylinders at the Royal Aircraft Factory under the direction of F. M. Green, A. H. Gibson and G. S. Wilkinson from 1915 to 1918 may be said to have constituted the origin of the modern air-cooled cylinder as we know it today.

While the use of aluminium as a cylinder material may not seem like a very large step, it nevertheless was a considerable mental

CORRESPONDENCE . . .

hurdle in 1915 when red hot air-cooled cylinders of cast iron and steel were not uncommon and when aluminium had a very bad reputation for use at high temperatures. When the Royal Aircraft Factory started its work with aluminium air-cooled cylinders, aluminium pistons were just beginning to be used in aircraft engines, with somewhat uncertain results. Viale wrote me that he used aluminium pistons in 1911 but without success. The early aluminium cylinders at the Royal Aircraft Factory at once showed that air cooling took on a new light in comparison with what we had previously known.

While Viale did not make a success of aluminium air-cooled cylinders, I think it should be recorded that his was the inspiration that resulted in a most important development.

Detroit, Michigan — S. D. HERON

A Passenger's Appreciation

I RECENTLY travelled to Paris by the coach-air service from Lympne run by an independent operator, and during the journey I found reason to complain, later, to the company. Some time later I received a reply to my trivial complaint, to the effect that it had been investigated and found justified. The operator then offered me a 25 per cent reduction on my next trip to Paris with his firm, as some compensation.

Many airlines, including the smaller independents, come under constant criticism from carping passengers. It is refreshing to find a company sufficiently conscious of its responsibility to the travelling public to be able to admit a mistake and to make amends amply.

For your information the company concerned was Skyways, whose name you may publish if you wish.

London SE19 — JOHN B. BENTLEY

The Culdrose Gannets

WITH reference to the article "Gannet AEW.3s Join the Fleet" (*Flight*, March 11), there are in addition, and just for the record, one or two facts worth mentioning.

The first two AEW.3s were actually delivered to Culdrose on August 14, 1959, in readiness for the flying programme to commence with 700G Flight the following Monday morning (August 17). However, in spite of the excellent number of flying hours achieved with these aircraft, no mention is made of the fact that 700G lost one of the three original development AEW.3s in a take-off crash at Culdrose on January 25, 1960. Fortunately the crew escaped. Technically speaking, the Flight was then reduced to one aircraft at this time, although other AEW.3s were known to have been in holding at Culdrose in preparation to forming 849 Sqn A Flt, including the prototype AEW.3, XJ440.

Also, some Gannet AEW.3s were seen by local spotters flying over Cornwall and parts of Devon on Sunday, January 31, which rather contradicts *Flight's* statement that 700G only flew on weekdays.

I am at present compiling a plotted history of the Douglas Skyraider AEW.1s in service with 849 Sqn, many of which are still to be seen flying in the south-west of England. May I, through the medium of your excellent magazine, appeal to readers for any odd scraps of information which they might have on these aircraft? [Address: Fortfield View, Church Street, Sidmouth, Devon.] The loan of negatives of RN Skyraiders would be very much appreciated. I am particularly interested in procuring a photograph of one serialled WT097, which is an odd machine that carries the last three figures of its former USN serial 124097.

Sidmouth, Devon — NOEL COLLIER

"Two-Six!"

YOUR letters always interest me—particularly the recent ones regarding the expression "Two-six." I am surprised to see all the answers given by "the brass." As a SAC I was always on the receiving end of this expression, and on my station (a Fighter Comm. OCU) it was understood to be a corruption of "toute-suite."

London N8 — J. R. MCGIFFIN

AS a young apprentice I was once instructed to give a "Two-six" on the hangar doors. I rather stupidly enquired as to its origin, and was informed that it was the stores vocab. number in 1939, when the WAAF was formed (if this is when it was formed) for outsize brassieres, with a prefix "extra assistance required." Historians and librarians may easily disprove this explanation, but it is the best one I have heard, and I prefer to believe it.

London SW1 — KEITH E. JOHNSTONE, Assistant Aviation Manager, R. K. Dundas Ltd.

Early Days of the RAF

I WAS very interested in R. N. Bell's letter in *Flight* for February 19. He is correct regarding ranks. All medals issued to RFC/RAF personnel bear on the edge Army ranks followed by "RAF." My own, for example, states: "Lieut RAF."

Majors and above, incidentally, wore "scrambled egg" on the peak of the caps mentioned by your correspondent. The upright bars on the caps were withdrawn after a few months.

Chippenham, Wilts — L. W. NORMAN (Late RFC and RAF)

THE INDUSTRY

Roy Edmonds Retires

YESTERDAY, March 31, saw the retirement of Roy Edmonds, MBE, well known in the industry for many years in connection with his management duties at the Vickers-Armstrongs (Aircraft) Company's Weybridge works. After RNAS service in the First World War Mr Edmonds started at Weybridge as a fitter; and after various promotions he became works manager in 1940, a position which he held until 1953. His responsibilities during the Hitler War period included the dispersal of manufacturing facilities after the works had been bombed in September 1940. He was promoted to works superintendent in 1953, a post which he occupied for 18 months until, at the age of 65, he was made manager, works administration, and subsequently assistant to the general manager.

At a farewell luncheon on March 21 Sir George Edwards (managing director) paid a warm tribute to Mr Edmonds, particularly for the part which he—and his wife—had played in the outside activities of the firm; it was such things, he said, that helped towards a contented works.

Arle Court Reorganization

DOWTY ROTOL LTD announce that under a reorganization scheme in their Engineering Department at Cheltenham, effective from today, L. C. Fairhurst becomes technical director. Under his control will be the Arle Court Design Department, headed by A. A. J. Willitt as chief engineer, and dealing with the traditional Dowty products, and the Staverton Design Department under E. Danvers as chief engineer, handling the traditional Rotol products. Mr Fairhurst was previously technical director and chief engineer of Rotol; Mr Willitt chief designer of Dowty Equipment; and Mr Danvers deputy chief engineer of Rotol.

The former design activities of British Messier are now absorbed entirely within the Arle Court design organization.

Winston-Dynamics Merger

UNDER a merger agreement, Winston Electronics Ltd has become a wholly-owned subsidiary of the Dynamics Corporation of America. F. Winston Reynolds is to continue as chairman and managing director, Roger Laurence as director of research and technical director and Joseph Samuels as works director, under long-term contracts. T. Anderson leaves the board.

The Winston Electronics factory and engineering and research facilities are to form the European sales and manufacturing base for D.C.A.'s present and future products, including tropospheric scatter communications equipment. D.C.A. are to increase their output in the USA with products designed and developed by Winston Electronics, including electronic and telecommunications systems.

IN BRIEF

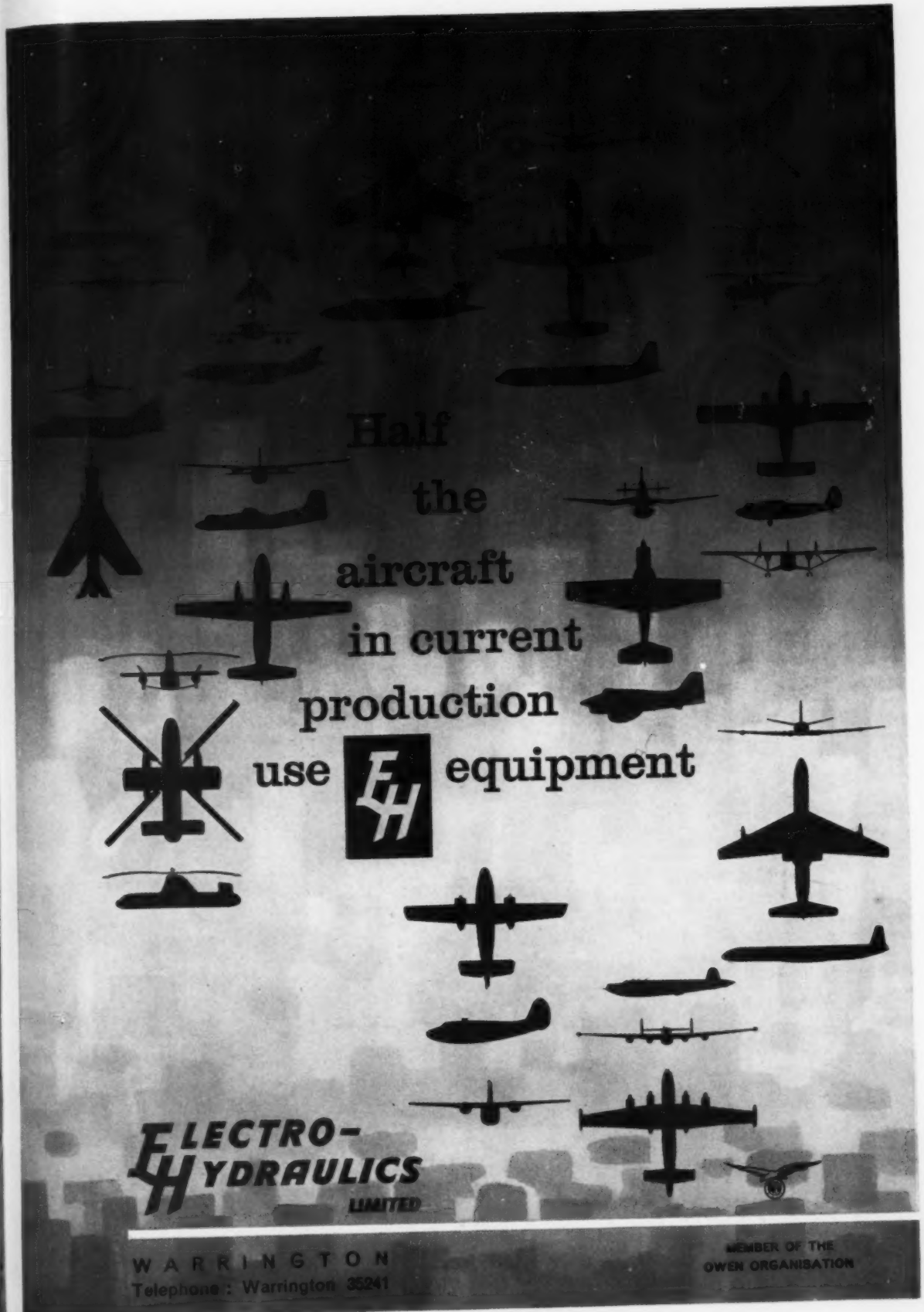
R. W. Denney, BSC(ENG), AMIEE, has been appointed chief inspector of Ultra Electronics Ltd. He joined the Ultra organization in 1950.

E. J. Hudson has been appointed divisional manager of the General Services Division of the Plessey Co Ltd, Swindon Region.

It is learned that the association existing between Sqn Ldr Neville Duke and Parman Aircraft Supplies Ltd ceased by mutual arrangement on December 1 last.

Edward Tauchert, MIMECHE, FRHI, has been elected chairman of Venner Ltd. He was appointed managing director of the company and its subsidiaries in October 1958 and will continue in that capacity in addition to his chairmanship.

S. G. Spooner has been appointed works manager of Marconi Instruments Ltd, St Albans, with responsibility for manufacturing activities, industrial relations, works services and welfare. Originally with Marconi at Chelmsford, Mr Spooner served with the Royal Artillery during the war and was seconded to the Inter-Services Research Bureau in 1941. After the war he returned to Marconi, joining their Airborne Development Division at Writtle. He went to Marconi Instruments as production manager in 1955.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TWO NEW TOOLS FOR THE AIRCRAFT INDUSTRY

The Desoutter type 2SA/201 Reversible Corner Nutrunner is a brand-new tool. It can locate nuts to within $\frac{11}{32}$" of a corner.

Another new Desoutter tool, the type SR11 Collet Grinder, weighs only $3\frac{1}{4}$ lbs and has a running speed of 16/18,000 r.p.m.

Among the large range of Desoutter Tools for the aircraft industry are Rackfeed Drills. A group of these are shown here helping to construct the wing section for the Comet Mk 4 at the Hatfield factory of the De Havilland Aircraft Company.

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SERVICE AVIATION

Royal Air Forces and Naval Flying News

A Twin Pioneer of No 230 Sqn during Exercise Starlight (reported on pp 432-4), confronted by Massey-Ferguson forward lift agricultural tractors employed for palleted loads

"Flight" photograph

Air Ministry Promotion

A NEW Deputy Under-Secretary of State at Air Ministry has been appointed, Frank Wood succeeding R. H. Melville, who is taking up a deputy under-secretaryship at the War Office. Mr Wood has been with Air Ministry since 1938 and an assistant under-secretary since 1955.

Senior WRAF Posts

TWO senior WRAF appointments have just been announced. Gp Off Jean Conan Doyle is to be Deputy Director from next Monday, and she is being succeeded as Inspector of the WRAF from April 11 by Gp Off Louise Turner, Deputy Director since February 1957.

Pilot Scheme

AT RAF Valley in Anglesey a training school equipped with Varsities is to be started later this year to train pilots for piston-engine assignments in the RAF, on Beverley or Shackleton squadrons. This will form a pilot scheme for the multi-stream training to be introduced in a year or two's time, possibly in 1962, under which pilots are to receive training on a type of trainer comparable with the operational aircraft they will fly. No details, however, have officially been given as yet though an announcement is expected in a few weeks' time.

Carrier Future

THAT further developments in the design and performance of jet aircraft, increasing use of helicopters and possibilities opened up by aircraft of the STOL type suggested that the aircraft carrier was unlikely to remain static in concept was the view put forward by J. H. B. Chapman, a member of the Royal Corps of Naval Constructors, in London recently when he read a paper before the Royal Institution of Naval Architects. He expressed the view that should there be a prolonged war the war at sea would be concerned largely, if not wholly, with the defence of sea transport; and it seemed prudent to assume therefore that a naval air arm would be required for many years to come. The United States was showing its belief in the future of the aircraft carrier by building the *Forrestal* class, mighty ships of over 75,000 tons deep displacement. The length of their flight decks exceeded 1,000ft.

Mr Chapman said that the operational advantage of nuclear propulsion for this type of ship was clearly worthy of detailed consideration. Here again the US Navy had taken a bold lead with the *Enterprise*, of 85,000 tons deep displacement, powered by slight reactors giving a top speed of some 33kt.

"Nuclear power gives spectacular endurance at high speeds," he said, "with greater freedom from land based and seaborne support. It permits the carriage of more fuel and stores for aircraft, and the absence of funnels and uptakes allows improvements in design to be made."

But the advantages had to be balanced against initial and running costs as well as engineering, personnel and safety problems.

Army's 6-3 Win

THERE was a reasonable whiff of competition in the air at Twickenham last Saturday, notwithstanding the Grand National and FA Cup semi-finals and Wales v. France: for if the Army won they would become Services' rugby union champions, whereas if the RAF won they would at least share the title they held outright last season. In the event, the Army won without glory, by two penalty goals to one kicked for the RAF; and what might have been an entertaining contest proved a drab exhibition of largely negative tactics. These were exemplified in an excessive amount of touch-kicking, excusable under certain conditions but hardly to be condoned when a more adventurous policy might have paid dividends. Much line-out play resulted, most of it undistinguished; and the set scrummages were untidy with some slow heeling. Shillinglaw, the Army's quicksilver Scottish international scrum-half, made the most of the ball when he got it; and the RAF's best attacker was Hackett. Paradoxically, the Army (for whom Crooks kicked both penalties) did not wholly deserve to win; and the RAF, for whom Mettler scored, defended well enough to have at least earned a draw.

IN BRIEF

The 40th anniversary of the RAF Benevolent Fund is being commemorated by a service of thanksgiving at 10.30 tomorrow (Saturday, April 2) in the RAF Church, St Clement Danes.

A memorial service for Air Chief Marshal Sir Frederick Bowhill is being held in St Clement Danes at 12 noon next Friday, April 8.

Cheltenham and Gloucester branches of the RAFA are joint organizers of an air display which is being held at Staverton Aerodrome on June 25.

The Curtis Memorial Prize for the best results achieved by an airman or airwoman in the GCE examination has been won by Sgt A. H. Binning, an air signaller stationed in Germany.

The RAF Benevolent Fund made 14,986 awards last year and spent £495,000 on all forms of assistance to serving and ex-Service RAF and WRAF personnel and their families and dependants.

Among Easter activities by over 400 cadets from the two RAF Colleges are an expedition to the Kufra Oasis in the Libyan Desert, a visit to the United States and research (by two Henlow cadets) into the Loch Ness monster.

The annual dinner of the RAF Education Branch—open to past and present officers of the Branch, civilian education officers and retired permanent members of the former RAF Educational Service—is being held at Overseas House, St James's, London SW1, next Friday (April 8) at 7.30 p.m.

In the desert for Exercise Starlight:—at left, members of No 8 IRF, Army Air Corps: Maj R. H. Matthews (the CO), Capts B. H. Adams and R. J. Dance, Lt J. Gourd (with Maida) and Capt K. J. Valenzia (Adj); the CAS, Air Chief Marshal Sir Thomas Pike, leaving by Comet after visiting the exercise; and at the airhead: Sqn Ldr W. J. Simpson (CO No 230 Sqn), Flt Lt J. W. Birch (Adj at Tmimi), Wg Cdr G. Sproates (Station Cdr) and Sqn Ldr J. R. Tilleard (STO)

"Flight" photographs

The problem of how to deliver eight tons of delicate and bulky Ultra electronic equipment to the Hebrides was solved last week by the Armstrong Whitworth Argosy. See news-item below

AIR COMMERCE

EL AL BUY 707s

AFTER a good deal of speculation as to which jet airliner the Israeli airline El Al would choose, it became known last week that the airline has decided to buy two Boeing 707-420s (Rolls-Royce Conways). An option on a third aircraft has been placed, and it is understood that the ExIm bank is expected to help finance the purchases with substantial credits. Services would be started in July 1961; more jet aircraft would be bought in 1962.

TONIGHT'S THE NIGHT

TODAY, April 1, sees the inauguration of BEA's Comet 4B services. Comet 4Bs will depart from London for Athens and Moscow to launch the BEA jet programme, plans for which were outlined in *Flight* for November 6, 1959.

In the Commons earlier this week Duncan Sandys, Minister of Aviation, said he had authorized BEA to operate their advertised night schedules [i.e., movements between the "banned" hours of 2300 and 0700] on condition that their noise does not exceed that of piston aircraft. Comet tests had shown that this was practicable. The Minister agreed to give Mr Hunter full information on the tests.

GENTLE ARGOSY

ONE of the few aircraft that could have flown into the small airfield of Benbecula in the Scottish Hebrides with an eight-ton load of electronic gear for the Ministry's guided-missile range was the Argosy. The bulk and delicacy of the units led to an approach to Armstrong Whitworth, and the company loaned G-APNR for the flight from London Airport. This took place on March 25. The pilot was Eric Franklin, AW's chief test pilot.

The flight was arranged by MAT Transport Ltd, transport agents of the manufacturers of the equipment, Ultra Electronics Ltd.

FURTHER AMENDMENTS TO THE BILL

AT its second sitting the Commons Committee B got down to the hard core of the problems posed by the Civil Aviation (Licensing) Bill. In what circumstances will new licences be issued without damaging the established operators—meaning, particularly, the corporations?

Mr Strauss, for the Opposition, moved an amendment which sought to provide that any new licence would not "prejudice the efficient operation, the financial results or the prospects of existing and prospective services." He emphasized the large sums—"hundreds of millions of pounds"—of taxpayers' money invested in the corporations and claimed that any new British competitor who diverted traffic from them would weaken them in their struggle against foreign competition. Since the Minister and his supporters repeatedly declared that they did not wish to damage the corporations, Mr Strauss hoped that they would accept his amending new clauses. He was disappointed.

In rejecting this amendment Mr Sandys declared that it was essential, when it came to new applications for licences, for all applicants to be on an equal footing and for the old distinction of corporation and non-corporation to disappear. At the same time he was careful to emphasize that whilst all would be equal, some would be more equal than others. The corporations—"the giants"—had the resources, the existing routes, and any financial commitments for new developments must, as the Bill is now drafted, be taken into account. All these factors, Mr Sandys said, gave the corporations "a very large measure of security."

The more one considers this section of the Bill and some of the general phrases used, the more does one realize that the phrases are meaningless (or open to different meanings) until the new board evolves its own techniques for interpreting them. At what point, for example, does diversion of traffic become "material"; when are duplicated services "wasteful"?

At the same time, it seems strange that the word "efficient" is not to be found among the detailed considerations which the board shall take into account when exercising their licensing functions. An existing service may be "adequate" without being economically efficient. On the other hand a new licence might well be granted without any material diversion of traffic from existing operators, but the economic efficiency of the two operators, old and new, could be impaired. It is possible that a duplicated service would not undermine the financial stability of the organizations concerned, simply because they were able to recover costs from the passenger.

The question of "efficiency" may well be covered by the "public interest" point. Mr McMaster sought to deal with this by inserting, among the matters which the board should take into account, "the advancement of British aviation throughout the world, the interests of the travelling public and the reduction in the cost of air transport." The Minister said that he could not accept this form of words but he admitted there was a case for placing a general duty upon the board to consider these matters. He promised to bring forward an amendment along these lines, probably as a preamble, at the report stage of the Bill.

Mr Sandys was in fact quite forthcoming with his promises. He gave other undertakings for the next stage. To Mr Burden he promised to look at the possibility of dealing with the case of aircraft registered in the UK which indulged in unwarranted competition from a base abroad. From Mr Redhead he undertook to accept a suitably worded amendment which would ensure that operators, before being granted licences, observed proper conditions of employment.

Finally, on the second sitting of the committee, the Minister promised Mr Hunter that he was prepared to accept, or even to bring forward himself, an amendment at the report stage to deal with third-party insurance. Mr Hunter, who has apprehensive constituents living around London Airport, has raised this question before in the House. Motor cars, he claims, are compelled to have adequate third-party cover; why not aircraft? The Minister said he supported Mr Hunter's purpose.

One of the comparatively few divisions of the committee took place on the question of Ministerial observations to the board. A Conservative amendment to leave out the line which specifically requires the board to consider "any observations made to the board by the Minister" was readily accepted by Mr Sandys. He said that his power to "consult" with the board was covered by another section of the Bill.

Mr Rippon also moved another new clause which involved important changes in relation to fare-fixing. As originally drafted the Bill provided that fares for domestic services would be fixed by the board and that those for external services would be fixed by the Minister. The effect of the new clause will be that the board will in the first place fix *all* tariffs, but external tariffs fixed by the board will require confirmation by the Minister, whose decision will be final. On the other hand, the board will be enabled to propose changes in international fares, or the introduction of new classes of fares. Any affected party will have the right of appeal to the Minister against the decision of the board in regard to both the granting of the licence and the level of the fares fixed.

Mr Chetwynd, in expressing Opposition doubts about the change, thought this would give an entirely new status to the board, would involve their attendance at international fare negotiations, and would require staff which would duplicate the Ministerial department which now dealt with the matter, and still be responsible for advising on the ultimate Ministerial decision. Mr Strauss said, understandably, that the Opposition needed time to reflect on the implications of this change.

FRANK BESWICK

WILL BRITAIN STILL GO IT ALONE?

AMONG the questions posed last week in our review of the new IATA fares for 1960-61 were: Is it still Government policy that, to quote the Minister, "moves on the cabotage front cannot be ruled out if we fail to get material reductions through IATA"? Does the Minister consider that the reductions recommended by IATA are, in fact, "material"? If so, does he now "rule out moves on the cabotage front," moves which he has approved at levels 10-20 per cent below the present lowest IATA fares?

Just after last week's *Flight* went to press, BOAC issued a statement summarizing the implications of the new fare agreements for the corporation. The most notable aspect of this statement was the absence of any mention of cabotage fares. Asked to quote the fares that will be available on BOAC's cabotage routes [from London to Aden, Bermuda, Hong Kong, Kingston, Nairobi, Nassau, Salisbury, Singapore, Trinidad], a spokesman for the corporation declined to comment.

A decision on whether the UK will take advantage of its rights to undercut the IATA fare structure on its sovereign routes has still to be announced. Having used these rights as a lever to prise lower fares out of IATA (which at the eleventh hour the Association agreed at the specially convened IATA meeting in Paris), the questions posed above are obviously extremely delicate, though an answer cannot be long delayed. In the Commons earlier this week the Minister said he expected to make a statement [believed to be next Monday] dealing with international and—significantly—cabotage fares.

It is also being asked by the British communities in Salisbury and Nairobi, and their relatives and associated business interests in the UK, whether these territories will be able to enjoy the advantages of the special "16 per cent off" IATA fare to be made available between the UK and South Africa.

BOAC have given a few examples of the IATA reductions. It was known when last week's issue of *Flight* went to press that the cuts will be 6-10 per cent below tourist on the eastern routes, the fare being designated—disenchantingly—economy class. The new BOAC "economy" fare from London to Rangoon will be £179, a reduction of just over 8½ per cent on today's fare. The London - Tokyo economy fare will be £242, a reduction of not quite 6 per cent. The London - Sydney economy fare will be £248, a reduction of 6 per cent.

On the Caribbean route, on which it was said by IATA that economy class reductions of "up to 16 per cent" will be offered, BOAC quote a fare of £156 2s to Caracas—a reduction of less than 1 per cent (though on propeller aircraft the cut will be nearly 9 per cent).

Footnote: One area not resolved by the Paris conference was the Pacific. A spokesman for PanAm says that there is "very little likelihood of a fares war on these routes. . . . The chances are that the companies will get together by the end of March to work out at least a temporary agreement for themselves." The airlines principally involved are PanAm, Northwest and Japan Air Lines. The main point of dispute is understood to be economy-class seat pitch: PanAm and JAL want it to be the same as everywhere else, 34in, though Northwest "has some other ideas."

PROTEUS MILLIONAIRE

A MILLION flying hours have now been logged by the Proteus, which has been in service as the Britannia powerplant for three years. This little historic occasion has prompted Bristol Siddeley to summarize the work and whereabouts of the Proteus family:—

Proteus 705 (3,900 e.h.p.). Powerplant of the BOAC Britannia 102 fleet. A number of 705s have successfully completed trials to an overhaul life of 2,400hr, clearance for which is expected "in the near future."

Proteus 755 (4,160 e.h.p.). Powerplant of the 300- and 310-series Britannias which went into service in December 1959. It was succeeded by the. . . .

Proteus 760 of improved fuel consumption. Variants of the 760 are:—

Proteus 761 (4,175 e.h.p.). In operation with BOAC, El Al, CPAL and (on charter from BOAC) CAA, EAA, Ghana Airways and Nigerian Airways.

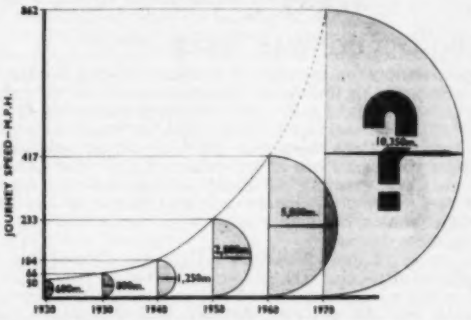
Proteus 762 (4,350 e.h.p.). This is the "hot and high" development of higher take-off power but with the same cruising power as the 761. It is operated by Aeronaves de Mexico, Air Charter and Transcontinental SA.

Proteus 765 (4,445 e.h.p.). This is the current production engine, and is the version operated by Cubana.

Proteus 255 This is the RAF Transport Command version of the Proteus 757, which powers the Britannias of British and Commonwealth (Hunting-Clan).

First air-to-air picture of the Allison Convair turboprop conversion which is now entering the market pioneered by the Convair/Canadair 540 (Napier Elands). Powered by Allison 501-D13s and first flown on January 19, five have been ordered (plus an option on ten) by Lake Central for service in the late summer, and 11 executive versions have been bought also. Powerplant is that of the Electra

THE 12-HOUR JOURNEY BY AIR



This is one of the graphs screened by Sir George Edwards of Vickers in his recent address to engineering graduates ("Flight" last week, page 396). The distance a man has been able to travel in 12 hours over the years produces, when plotted on a log scale, a remarkably straight line compared with the curve above; and on a "fair extrapolation" of this line lies a Mach 2.2 transport timed for 1971-72

EUROCONTROL PRESSES ON

LAST week saw the twelfth meeting of the Eurocontrol Technical Working Group in London under the chairmanship of Capt V. A. M. Hunt, director of Control and Navigation, Development and Planning, Ministry of Aviation. Eurocontrol has been proposed by the six common market countries and by Britain to work out a plan for the control of traffic in the upper airspace (not the lower levels) from a common centre. The working group is considering the technical aspects and has spent the week investigating various proposals for equipment. Among those put forward by a number of companies was one by Ferranti for a fast variable-programme computer and associated equipment being developed experimentally for the Oceanic Area Traffic Control Centre at Prestwick.

Ferranti are also among more than ten British companies that have tendered for a contract for experimental semi-automatic traffic control equipment which is to be set up near London by March 1962. The Dutch Signaal company, manufacturers of the SATCO system, has also been prominent in these negotiations.

No firm decisions have yet been taken in connection with Eurocontrol equipment and many political questions have first to be settled. The location of the common control centre, for example, has not yet been fixed, but some progress may be made when a draft convention is proposed at a meeting of the directors of civil aviation to be held later in the spring.

ALMOST IRRESISTIBLE

AMONG the inducements offered by US manufacturers to Sheikh Najib Alamuddin, chairman of MEA, was an undertaking to buy MEA's seven Viscounts at their original book value, and to extend eight years' credit for new US equipment at an interest rate of six per cent. This is reported by the Beirut correspondent of the *Sunday Times*. MEA have now confirmed an order for four Comet 4Cs.

Among the other proposals made by US manufacturers, it is said (the source was the Sheikh), was for another operator to run MEA's routes, to pay all costs and to give MEA 12 per cent of the gross revenue over a period of eight years. After this all aircraft, equipment and premises would become MEA's absolute property. One US manufacturer guaranteed delivery of major components within 96hr of receipt of order and promised to establish an over-the-counter spares service in Beirut.

According to the Sheikh, both Lockheed and Boeing made offers "so attractive as to be almost irresistible."

Good for Cunard: Sir John Brocklebank (right), chairman of the shipping company, is seen with his general manager, Percy Furness, after the meeting at which it was announced that a controlling interest in Eagle is to be purchased. See the note "British Cunard Eagle" below

AIR COMMERCE . . .

AIR-INDIA'S CONWAY 707-420

IN preparation for commercial services between Bombay and London starting on April 15 (and later to be extended to New York), Air-India have been making crew-training flights in Europe. Two aircraft have so far been delivered, a third will arrive soon and the fourth in 1961. A *Flight* representative recently accompanied one of the training flights from London to Paris and back with four Air-India captains and other members of the twelve crews now under training. Each crew has 20hr of simulator training in Bombay and ten to 16hr local flying before starting route training.

The cabin of this 707-420, VT-DJI, was divided into large four-abreast first-class and six-abreast tourist sections, with very pleasant décor. Take-off from London, at 200,000lb gross, took less than half the available distance, and the aircraft was at 1,300ft over the end of the runway, climbing at 3,000ft/min. Take-off acceleration was formidable, with remarkably low noise-level. At 27,000ft the ground-speed was 515 m.p.h. Touchdown appeared fast, but was followed by a flapped and spoilered deceleration with reverse thrust booming and brakes firmly applied—an impressive procedure. For the return flight the take-off run took 28sec at the same weight and with the same Comet-like (almost) climb-out. Cruising at 28,000ft, take-off to touchdown time was 46min—three minutes longer than the recent Vanguard flight from Le Bourget to London. Normal cruising speed is 480kt TAS.

Particularly impressive have been the performance and behaviour of the Rolls-Royce Conway R.Co12 with its 18,000lb thrust. Both Boeing and Air-India spoke highly of the engines and passengers will find a lower noise-level both on take-off and in cruising flight. A. C. Gazdar, the airline's technical director, said last week: "The Rolls-Royce Conway engines of the 707-420s have exceeded all our expectations and have gone faultlessly throughout all our flights."

AFTER BARBADOS

FOLLOWING our report last week that the Anglo-US talks at Barbados to review the Bermuda Agreement had been "recessed" there have come reports from America that three decisions have been reached. *Aviation Daily* says that North-west will, after all, be granted by the UK its long-sought rights at Hong Kong. There is "a good chance," adds the report, that TWA and Seaboard & Western will be given "more flexible" beyond-rights from London. Whether this means that TWA will be allowed to extend their North Atlantic services from London to the Middle and Far East remains to be seen. Lastly, the American report states that Section IV(b) is being redrafted. This section, it will be recalled, is the controversial footnote to the route schedules which permits airlines of either country to "write in" intermediate points.

Though no one would be surprised if the troublesome Section IV(b) is redrafted, it is certain that the UK has not yet given the American carriers Hong Kong and beyond-London rights. If these controversial rights are conceded, it will be in exchange for new rights for British carriers. Probably the reason for the recess is for high-level consideration by each Government of the likely acceptable exchanges discussed by each side at Barbados.

BRITISH CUNARD EAGLE

THE most significant remark made by Sir John Brocklebank, chairman of Cunard, with reference to the controlling interest (reported in *Flight* last week) that his company proposes to take in the Eagle group of companies, was as follows: "We are talking with BOAC about a mutual arrangement . . . The size of our air fleet depends on the talks we are having with BOAC, and whether we get route licences. The main licence we are seeking is for a weekly service from London to Bermuda and back, and the Britannia will be able to do that."

It is significant also that Sir John referred to Cunard's desire "to provide people with the last word in luxury." This can only mean that the Eagle share of the London - Bermuda traffic will not be confined to the low-fare market. The question now is whether Eagle, having made arrangements for the resources and financial backing to satisfy the policy of the Minister, will be granted the London - Bemuda licence for which they applied on October 18, 1957. This application was actually made by the then newly-formed Eagle Airways Bermuda, and it was approved by the Colony on September 15, 1958. The fare was eventually fixed at £124 return—£94 less than the BOAC tourist fare. It was, in fact, a VLF fare. Much to Bermuda's resentment (see pages 147-149 of *Flight* for January 29, 1960) the application has never been approved by HMG.

Will it be approved now? It is possible only to speculate upon the answer; but the significance of the Cunard chairman's remarks is self-evident, and it looks as though he has hopes for something more than a VLF fare.

It is also extremely interesting that Cunard should be talking with BOAC about a "mutual arrangement." Sir Gerard d'Erlanger, chairman of BOAC, confirms that discussions are taking place "to explore possible ways and means in which Cunard and BOAC might collaborate to further British interests across the Atlantic." So here we have (1) Cunard and Eagle working with, rather than against, BOAC; and (2) a tripartite British air corporation-independent-shipping partnership which will obviously be of great advantage to Britain on what is, after all, the world's most important route.

There were informed reports last week that Cunard have financed the purchase by Eagle of three VC10s. This was not confirmed by Cunard or Eagle. But the independent need no longer regard such modern jet re-equipment as beyond its reach. Here it is appropriate to recall the words of Eagle's chairman, Harold Bamberg, to Frank Beswick in *Flight* on February 26: "Our concept is that for long-haul routes a pure jet operation is the cheapest. We expect to reach a definite decision about the type we need within the next two or three weeks." Since then of course Eagle have leased, with an option to purchase, a Britannia 318 from Cubana. Will they now buy Comets?

JAPAN DECIDES ON THE 880

THE culmination of an "extensive study of medium range jet airliners" by Japan Air Lines is a recommendation to the government for the purchase of three Convair 880 22Ms. The cost would be about £1.4m ($3.9m) each.

The study was undertaken by a team led by Tetsuo Oba, JAL's director of operations and maintenance. The first 880 would be delivered in May 1961, and the remaining two in the following month. They would enter service in the early summer of 1961 on the airline's South East Asia network, and on JAL's new southern route to Europe.

Footnote: The 880 22M is the "domestic" variant modified ("M") for shorter ranges. It is the version ordered by Capital, and is powered by straight-jet General Electric CJ-805-3Bs.

AIR SAFETY MUST BE ENFORCED (Continued from page 442)

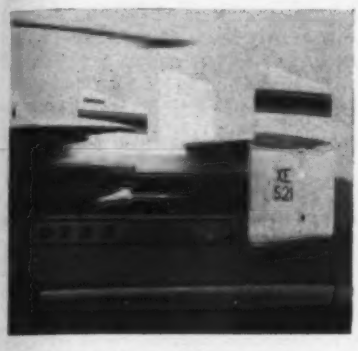
incidents. These are the powers that may need strengthening. This is the staff which may need augmenting. The regulations may require detailed improvement. But there is a very weak case for the creation of an air operator's certificate as a remedy in itself. All the practical and theoretical advantages of certification can be obtained without an actual certificate by making the grant and renewal of the proposed separate air service licence conditional upon the receipt by the ATLB of a satisfactory safety report from the Minister's official charged with aviation safety (at present required only in respect of applicants for scheduled services). Of course, this would mean that there was no right of appeal on safety matters. It is doubtful whether any right of appeal is necessary—any more than one is necessary on the issue of Certificates of Airworthiness or on the grant or withdrawal of ARB approval for a particular inspection organization. The liberty and livelihood of individuals is not directly at stake, and the criteria of air safety should be objective and beyond dispute. No right of appeal is provided in these cases and none seems to be required. The criterion should always be "adequate regulations, wisely enforced."

MR MEKIE AND SIR BRIAN

THE proposed air-rail financial arrangement between Silver City and British Railways will not now take place. It will be recalled that early last January (*Flight*, January 15) news leaked out that Sir Brian Robertson, chairman of the British Transport Commission, had been negotiating with Eoin Mekie, chairman of Silver City, for the purchase of a minority share in the independent airline.

It is not known for what reason the negotiations have broken down, but the grave financial state of British Railways is such that Government approval of an additional capital investment—progressive though this one appeared to be—was never likely to be easily forthcoming. Possibly the Guillebaud Report, which will cost the taxpayer perhaps £40m in higher railwaymen's wages, did not help the rail-air negotiations.

But the breakdown of the negotiations with Silver City does not rule out closer commercial co-operation between the airlines and British Railways. Such co-operation could involve, in addition to Silver City, Air Charter (*Flight*, January 22); and no doubt BEA have not overlooked the possible advantages of co-ordination with the railways.



A third fin has appeared on the prototype Fairey Rotodyne to improve stability at the high speeds now being attained on test flights

ELECTRA PRECAUTIONS

A LIMIT of 275kt (316 m.p.h.) IAS has been imposed by the FAA on all Lockheed Electras in US operation. This is a "precautionary measure" pending completion of investigations into the mid-air disintegration on March 17 of a Northwest Electra. The limit of 275kt IAS applies up to 15,000ft, and is reduced in a prescribed ratio above that height: for example, the limit is 250kt at 20,000ft (Continuous cruising speed of the Lockheed Electra is 352kt (405 m.p.h.) at 22,000ft and 82,500lb. Thus, in practice, the restriction will amount to about 100kt.)

The Northwest accident, says E. R. Quesada, administrator of the FAA, "appears to be sufficiently similar to a previous accident to the same type of aircraft last September near Buffalo, Texas." That accident, involving a Braniff Electra, was also due to apparent disintegration in the air.

A spokesman for the FAA said after a conference with Lockheed officials in Washington last week that there was no need to ground the Electra. After a meeting lasting two hours Mr Quesada said: "The meeting was constructive, helpful and informative, and will assist us materially in developing any appropriate action." A spokesman said that Mr Quesada considered that the speed restriction was a sufficient precautionary measure. An official who attended the meeting is reported to have said that it produced no agreement on what caused the Northwest Electra to disintegrate.

A spokesman for KLM in London last week confirmed that the speed limitation is being applied to their "intercontinental Electras "as a temporary precautionary measure, though we are not bound to do so since our aircraft are of a different type than those involved in the accidents." Their seven aircraft (12 are on order) would continue to fly on time "because of flexible timetables."

BOEING AND THE D.H.121

IN recent weeks representatives of Boeing have been studying the D.H.121 at the de Havilland Company's factory at Hatfield. It is reported also that Convair officials have visited de Havilland to see and discuss the D.H.121. This inevitably renews the speculation that has been rife for some time now as to whether an American manufacturer will—like Douglas have done with Sud Aviation in respect of the Caravelle—collaborate with de Havilland in the development of the D.H.121.

One of the more recent Boeing draft designs for the 727 short-haul jet has been based on a three-engined layout, using Allison-built RB.163s (ARB.963s), and this project has been generally very similar to the D.H.121. Sir Roy Dobson, who as chairman of the Hawker Siddeley Group is now responsible for the ultimate destiny of the D.H.121, has meanwhile referred to a Mk 2 version of the aircraft. This project, which might bear the type-designation D.H.124, is a heavier and more powerful version of the basic short-haul design, with improved payload-range capabilities. The maximum take-off weight would be greater than the 105,000lb of the basic D.H.121, but not as great as the VC11's 170,000lb.

Obviously, Douglas' West Coast competitors—who include Lockheed as well as Boeing and Convair—are anxious not to let the big potential US market for a short-range jet be scooped by the Caravelle; all three companies are known to have projects for a second-generation short-haul jet, and a joint Anglo-American effort is now being seriously talked about on both sides of the Atlantic. One matter which has to be given careful thought is the extent to which the UK is prepared to share with the Americans her automatic landing developments, the incorporation of which in the D.H.121 design from the outset (it cannot easily be retrospectively fitted into a design) is one of the 121's most advanced and competitive features.

Stop Press Four de Havilland engineers have recently returned from a visit to Boeing, Seattle. They are: C. T. Wilkins, chief designer; D. R. Newman, chief technician; John Wimpenny, senior aerodynamicist; and Peter Hall, technical sales manager.

YET MORE CO-OPERATION

FRANCE and Australia, whose new air service agreement was referred to last month, have both recently established a degree of collaboration in equipment between State-owned and privately owned airlines.

The two French independent airlines TAI and UAT are to pool their services to Africa and within the African continent, jointly operating their DC-8s. Air France and UAT are also to integrate regional African services. The suggestion for the pool came from Robert Buron, French transport minister, and is intended to rationalize France's air transport effort within the African continent, to provide technical collaboration on the big jets, and to meet "the needs of politically developing countries."

The UAT-TAI rapprochement will eliminate wasteful competition on the routes between France and points in the French African commonwealth. Meanwhile TAI have at last got traffic right at Sydney on their routes to Noumea in French Caledonia and beyond to the US West Coast, where they will link up with Air France to establish a French round-the-world route.

The Australia agreement is between the State-owned Trans Australia Airlines and the privately owned Ansett-ANA. The latter are to charter three Viscount 700s from TAA and Trans Australia are to charter two DC-6Bs from Ansett. This cross-charter arrangement was recently announced by Athol Townley, Australia's acting Minister for Civil Aviation, who said that it would ensure stability in the airline industry and enable both airlines to accumulate capital reserves necessary for future re-equipment. It would leave Ansett-ANA with an advantage in Lockheed Electras, but to offset this the government had approved the purchase of a third Electra by TAA.

This is how Sud Aviation's Caravelle assembly line at Toulouse appeared towards the end of March. Aircraft for Swissair, SAS, Alitalia and Air France can be seen, and outside on the apron were aircraft for Finnair and Air Algérie

AIR COMMERCE . . .

The Unions and the Bill

THESE comments are by Clive Jenkins, national officer and deputy to the general secretary of the Association of Supervisory Staffs, Executives and Technicians; he is also joint secretary of the supervisory engineering and technical panel of the National Joint Council for Civil Air Transport.

OBVIOUSLY, a trade union officer representing a large group of staff in the civil aviation business will be suspicious of a Conservative Government's motivations in setting up new licensing machinery for the industry. There is a certain subjectivity at work here. Most trade union members in this field work in the two public corporations and are covered by carefully drawn up and often comprehensive agreements. Organization of workers in the independent companies is, generally speaking, at a much lower level. This is partly due to staff turnover but also to the anti-union attitudes of many of the managements. Terms and conditions of service there, particularly pensions, are almost always inferior to those freely negotiated for identical work in BEA or BOAC.

This situation is frequently masked by the payments made for long hours; but, job for job, the independent companies are usually the worse employers. This may be doubted by those who have read the reply to the debate on the Civil Aviation (Licensing Bill) made on March 2 by the Parliamentary Secretary to the Ministry of Aviation. In two passages he explained that negotiated contracts could not be undercut. In the first he said:—

"One of the advantages of tightening up the safety regulations is that we shall ensure that there is no possibility of economizing in that direction. It is also fair to say that there is no possibility of the independents undercutting the corporations . . . by offering less favourable terms and conditions of service."

His second reference was:—

"The Bill leaves quite unaffected Section 15 of the Civil Aviation Act 1949, which provides that the terms and conditions of employment offered by independents, unless they are regulated by another Act, or by an agreement between the independents and the trade unions or in accordance with a National Joint Council agreement, must comply with the following requirements, that is to say, that they shall not be less favourable than the terms and conditions observed by the airways corporations in the case of persons engaged in comparable work."

This sounds like an effective assurance. In reality it is not. The Parliamentary Secretary seems unaware that, following the case [of a particular independent] which I took before the Industrial Court nearly ten years ago, almost every independent company split itself into two separate corporate parts. One part flies the aircraft, the other performs the ground functions. But, as the ground services company does not take powers in its articles of association to operate aircraft for hire or reward, it is legally held not to be "constituted" for that purpose. Therefore, Section 15 of the 1949 Act simply does not apply.

By this legal evasion the independents protect themselves from paying the negotiated rate for the job. This weakness in the Act *does* enable independent companies to undercut the corporations.

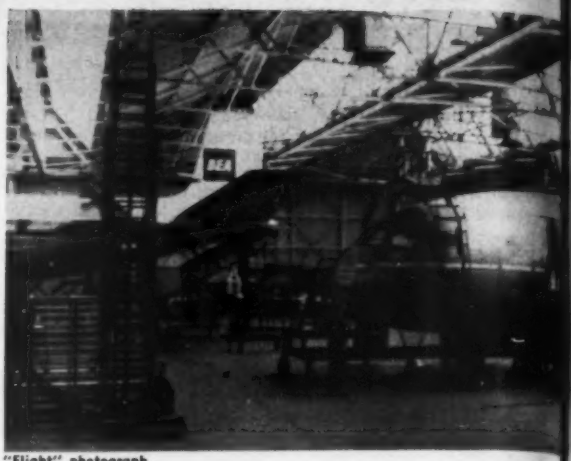
But, having made this point, I want to extend a highly qualified welcome to the new proposals. They obviously have some merits over the ATAC arrangements. Not the least is Section 2, which requires the board when hearing applications to "consider in particular" certain desiderata which include that in sub-para (e):—

"Any capital expenditure reasonably incurred, or any financial commitment or commercial agreement reasonably entered into, in connection with the operation of aircraft on air transport services by any person (including the applicant) who is the holder of any air service licence already granted."

This is a new requirement and is obviously of great importance to the corporations, who have been the objects of a great deal of State support and investment which have, in turn, buttressed the aircraft industry as a whole. It is also reassuring to see so much responsibility retained by a Minister who, one might gather from his speeches, adheres to the policy of the "chosen instruments." It is to be hoped that any competitive activity that results will not be restricted by artificial curbs on the natural expansion of BEA and BOAC, or that there will be any specially protective allocation of traffic or mails to private-enterprise operators who otherwise would not survive.

My own view is that, in a murderously competitive world, the State corporations should have restored to them a monopoly of scheduled services. Side by side with this should go a requirement that persons working on or around aircraft flying for hire and reward should be paid not worse than those in the publicly-owned sector performing similar tasks. No doubt the political situation is unsympathetic to this attitude, which will have to be pressed on a future administration.

In the meantime, I confess on a first examination that Mr Sandys' Bill could have been worse. But then, on the other hand, perhaps it will be.



"Flight" photograph

The first D.H.121 for BEA and the last Comet 4B for BEA—representing two generations of de Havilland jet airliner design—are seen together in the manufacturer's assembly hall at Hatfield

BREVITIES

It is reported that the USSR has offered Il-18s to India at a price of about Rs9m (about £675,000) each.

Air Liban, reports a Middle East source, is likely to purchase three Caravelles.

On March 23 an L.1049H Super Constellation of Lufthansa uplifted at London Airport for Malta a ship's propeller shaft weighing 27,400lb.

DTA of Angola and DETA of Portuguese East Africa are expected to sign for three Fokker Friendships in Lisbon in the near future.

May 31 is the date on which Blackbushe Airport will be finally closed. From today, April 1, the airport is closed from 0001 to 0800hr.

It is reported that United Air Lines and Sud Aviation have formed a joint company to sell 15 of United's DC-6s and DC-7s.

The Comet 4 simulator for Aerolineas Argentinas left the Aylesbury factory of General Precision Systems for Argentina on March 26.

A sum of £110,000 is provided for in the 1960-61 Civil Aviation Estimates as a contribution to the new College of Air Training.

No. 100 Boeing 707 was delivered on March 18. The aircraft was a 707-420 for Air France. A total of 210 Boeing jet airliners have been ordered.

Douglas announce that the DC-8 series 40 (the intercontinental model with Rolls-Royce Conways) was granted its FAA type certificate on March 23. Delivery has already been made to TCA.

Euravia, according to a Netherlands source, will pay about £59,000 each for the three Convair 340s traded in by PIA as part of their contract for three Fokker Friendships.

The Russian journal *Soviet Aviation* has announced a new plan by which passengers in transit through the USSR will no longer need visas and can stop-over for 24 hours without visas. This scheme was introduced about a month ago.

The extension to Prestwick's main runway was completed on March 23. It is now 9,800ft long. Completion of lighting and taxi strips will enable TCA to fly London - Toronto DC-8s via Prestwick early in June, followed by BOAC later in that month.

May 6 is the date agreed by the transport ministers of the Air Union nations (France, Germany, Italy and Belgium) for a meeting in Rome to settle the legal, financial and technical points which remain to be agreed before the Air Union can be inaugurated.

The FAA is proposing to require crack-inspection of the main undercarriage cross-shaft bearing channels on US Viscount 745Ds and 810s. A visual inspection would be required every 4,000 or more flights at intervals of not more than 160hr. Installation of reinforced inboard and outboard bearing channels would be required not later than April 1, 1961.

The commander of the BOAC Comet 4 which landed with its wheels up at Rome last December, Captain W. G. Wallace, has been demoted to first officer. The co-pilot on the flight, F/O D. G. Thornton, has been reprimanded with loss of seniority. No one was injured in the incident, and the aircraft was repaired on the spot and was back in service by February.

For the ninth successive year TCA made a profit in 1959—$152,554 on a revenue of nearly $135m. Average passenger load-factor was 66.5 per cent. The airline is trying to sell its surplus fleet of DC-4Ms as a package deal complete with powerplant-overhaul shop, simulator and spares, for delivery from September 15, when phasing-in of Vanguards will begin.

The FAA has formed a committee to make recommendations on the problem of slush-covered runways. Data will be supplied by the NASA, whose recent experiments at Langley Field may form the basis of the committee's recommendations. It is said that Boeing have found that 707 take-offs are lengthened by 10 per cent in half-an-inch of slush, and United has written an arbitrary off-load of 12,000lb into its [DC-8] flight manual for the same slush depth.

Only the VANGUARD

paces the jets at much less than half the cost

ALL ROUND Europe, and on record flights in Canada, the Vickers Vanguard has been logging block times which have proved that on short and middle distance routes it can more than hold its own with the jets. It has, in zero wind, beaten current jet schedules on sectors as long as London-Rome (955 st. miles). It has flown London-Gander (2,365 st. miles) in 5 hours 30 minutes, and Toronto-Montreal (335 st. miles) in a record 58 minutes in zero wind.

Other Vanguard block times are:

LONDON-BRUSSELS
230 miles in 45 minutes (5 m.p.h. headwind).

LONDON-HAMBURG
470 miles in 73 minutes—a record (17 m.p.h. tailwind).

LONDON-PARIS
224 miles in 41 minutes (zero wind).

PRESTWICK-KEFLAVIK
920 miles in 2 hours 35 minutes (zero wind).

KEFLAVIK-MONTREAL
2,360 miles in 6 hours 2 minutes (30 m.p.h. headwind).

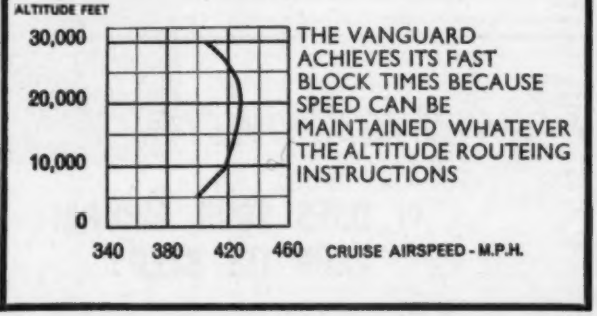
The Vanguard has achieved these block speeds at costs nearly one-third of those of comparable pure jet aircraft.

Recent U.S.A. figures show jet aircraft flight hour direct costs as 2.8 times greater than those of the Vanguard, and seat mile direct costs 2.6 times as great.

The Vickers Vanguard has, without doubt, the biggest profit potential ever offered to the airline industry—and it offers it at proved realistic competitive speeds.

The Economy Class cheap-fare capabilities of the Vanguard are at the forefront of the now established world movement for popular air travel. Only the Vickers Vanguard can bring these vast new markets to the Airlines on short and medium haul routes, at a substantial profit, and the Vanguard can do this with schedules as fast, if not faster, than any other aircraft.

Vanguard costs used in this comparison are to A.T.A. formula. Both the Viscount 745 and the Viscount 810 filed costs have been proved in practice to be substantially below such A.T.A. formula costs.



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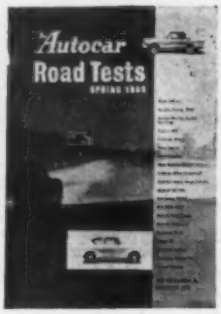

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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE AIR TRANSPORT ADVISORY COUNCIL give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM Derby Aviation Ltd., of Derby Airport, Burnaston, Nr. Derby:—

(a) Application No. 2373/1 for permission to include an optional traffic stop at Ostend, on the Normal Scheduled service which they are at present authorised to operate with Dakota and Herald aircraft, on the route Swansea and/or Cardiff and/or Bristol - Luxembourg, at a frequency of 2 return flights weekly from April 1 to October 31 each year, until March 31, 1966.

(b) For the following Normal Scheduled Services, with Dakota aircraft, for the carriage of passengers only, for 7 years from 1961:—

(i) unless otherwise stated, for seasonal services from April to October each year, at an initial frequency of one return flight weekly, on each service, increasing later in accordance with traffic demand.

Application No. 3436; throughout the year on the route Manchester and/or Birmingham - Paris (tech.) - Basle.

Application No. 3437; on the route Manchester and/or Birmingham - Luxembourg from April to September each year.

Application No. 3441; on the route Manchester and/or Birmingham and/or Derby - Vichy (tech.) - Calvi.

Application No. 3442; on the route Manchester and/or Birmingham and/or Derby - Vichy (tech.) - Albenga.

Application No. 3443; on the route Cardiff and/or Bristol - Vichy (tech.) - Albenga.

Application No. 3444; on the route Cardiff and/or Bristol - Vichy (tech.) - Calvi.

Application No. 3446; throughout the year, on the route Manchester and/or Birmingham and/or Derby - Toulouse (tech.) - Palma.

(ii) at an initial frequency of 2 return flights weekly on each service increasing later in accordance with traffic demand:—

Application No. 3440; on the route Bristol and/or Cardiff - Cork.

Application No. 3447; for a seasonal service on the route Manchester and/or Birmingham - Perpignan, from April to October each year.

(iii) at an initial frequency of 3 return flights weekly on each service increasing later in accordance with traffic demand:—

Application No. 3438; on the route Derby and/or Birmingham - Cork.

Application No. 3439; on the route Manchester and/or Birmingham - Cork.

Application No. 3445; on the route Manchester and/or Birmingham - Paris.

FROM Continental Air Transport Ltd., of 3 Queen Victoria Street, London, E.C.4; for the following Normal Scheduled Services, initially with Viking aircraft and later also with Dakota aircraft, for the carriage of passengers and supplementary freight, at an initial frequency of 2 return flights weekly on each service increasing later to 1 return flight daily, from May 1 to September 30 each year, for 7 years from 1960:—

Application No. 3449 between Cambridge and Ostend.

Application No. 3450 between Cambridge and Paris (Le Bourget).

FROM Tradair Ltd. of Southend Airport, Essex:—

Application No. 3448 for a Normal Scheduled service with Viking and Viscount aircraft for the carriage of passengers, supplementary freight and mail on the route Southend - Frankfurt or Munich - Vienna at an initial frequency of 3 return flights weekly increasing later to 1 return flight daily, for 10 years from June 1, 1960.

Application No. 3262/1 for an amendment to the terms of approval of the Normal Scheduled service which they are at present authorised to operate with Viking aircraft, on the route Southend - Bordeaux (tech.) - Seville - Agadir, at a frequency of 4 return flights weekly until December 31, 1966, so as to permit them to operate also with Viscount aircraft on the amended route Southend - Bordeaux (tech.) - Seville - Casablanca and/or Marrakesh until such time as conditions permit the service to be operated to Agadir.

FROM Don Everall (Aviation) Ltd., of Elmdon Airport, Birmingham:—

Application No. 9/8 for permission to carry supplementary freight and mail on the U.K. Internal Service which they are at present authorised to operate with Dakota aircraft until September 30, 1966, on the routes (i) Birmingham - Guernsey (opt.) - Jersey at a frequency of 1 return flight on Saturdays from May to September each year increasing to 2 return flights on Saturdays in July and August each year, and (ii) Coventry - Birmingham (inward only) - Guernsey (opt.) - Jersey, at a frequency of 1 return flight on each Friday and Saturday from mid-June to mid-September each year increasing to 2 return flights on each Friday and Saturday in July and August each year.

THESE applications will be considered by the Council under the Terms of Reference issued to them

(continued at top of column 3)

PUBLIC ANNOUNCEMENTS

(continued from foot of column 2)

by the Minister of Civil Aviation on July 30, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. [9717

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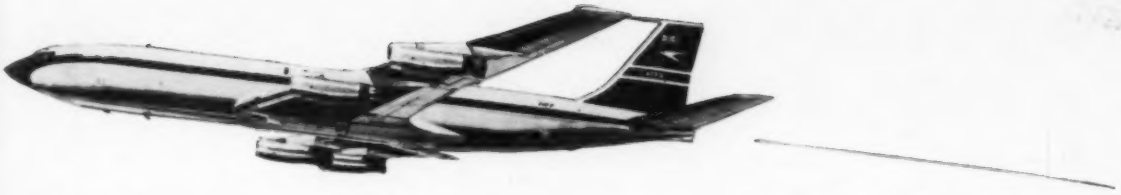

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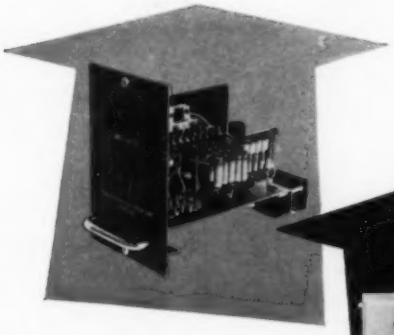

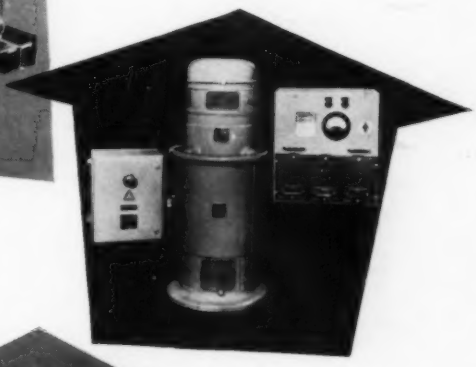

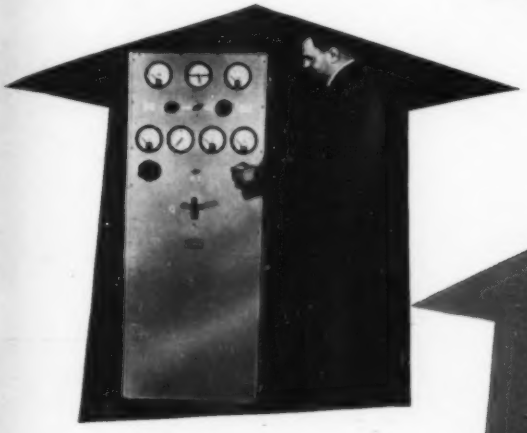

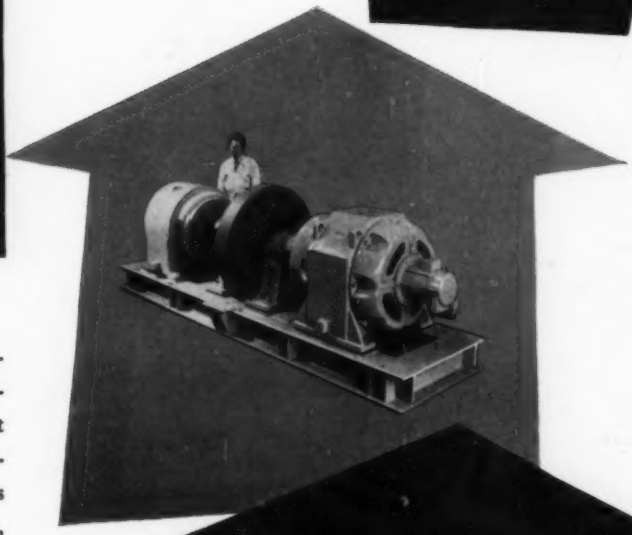

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Good for Cunard: Sir John Brocklebank (right), chairman of the shipping company, is seen with his general manager, Percy Furness, after the meeting at which it was announced that a controlling interest in Eagle is to be purchased. See the note "British Cunard Eagle" below

AIR COMMERCE . . .

AIR-INDIA'S CONWAY 707-420

IN preparation for commercial services between Bombay and London starting on April 15 (and later to be extended to New York), Air-India have been making crew-training flights in Europe. Two aircraft have so far been delivered, a third will arrive soon and the fourth in 1961. A *Flight* representative recently accompanied one of the training flights from London to Paris and back with four Air-India captains and other members of the twelve crews now under training. Each crew has 20hr of simulator training in Bombay and ten to 16hr local flying before starting route training.

The cabin of this 707-420, VT-DJI, was divided into large four-abreast first-class and six-abreast tourist sections, with very pleasant décor. Take-off from London, at 200,000lb gross, took less than half the available distance, and the aircraft was at 1,300ft over the end of the runway, climbing at 3,000ft/min. Take-off acceleration was formidable, with remarkably low noise-level. At 27,000ft the ground-speed was 515 m.p.h. Touchdown appeared fast, but was followed by a flapped and spoilered deceleration with reverse thrust booming and brakes firmly applied—an impressive procedure. For the return flight the take-off run took 28sec at the same weight and with the same Comet-like (almost) climb-out. Cruising at 28,000ft, take-off to touchdown time was 46min—three minutes longer than the recent Vanguard flight from Le Bourget to London. Normal cruising speed is 480kt TAS.

Particularly impressive have been the performance and behaviour of the Rolls-Royce Conway R.Co12 with its 18,000lb thrust. Both Boeing and Air-India spoke highly of the engines and passengers will find a lower noise-level both on take-off and in cruising flight. A. C. Gazdar, the airline's technical director, said last week: "The Rolls-Royce Conway engines of the 707-420s have exceeded all our expectations and have gone faultlessly throughout all our flights."

AFTER BARBADOS

FOLLOWING our report last week that the Anglo-US talks at Barbados to review the Bermuda Agreement had been "recessed" there have come reports from America that three decisions have been reached. *Aviation Daily* says that North-west will, after all, be granted by the UK its long-sought rights at Hong Kong. There is "a good chance," adds the report, that TWA and Seaboard & Western will be given "more flexible" beyond-rights from London. Whether this means that TWA will be allowed to extend their North Atlantic services from London to the Middle and Far East remains to be seen. Lastly, the American report states that Section IV(b) is being redrafted. This section, it will be recalled, is the controversial footnote to the route schedules which permits airlines of either country to "write in" intermediate points.

Though no one would be surprised if the troublesome Section IV(b) is redrafted, it is certain that the UK has not yet given the American carriers Hong Kong and beyond-London rights. If these controversial rights are conceded, it will be in exchange for new rights for British carriers. Probably the reason for the recess is for high-level consideration by each Government of the likely acceptable exchanges discussed by each side at Barbados.

BRITISH CUNARD EAGLE

THE most significant remark made by Sir John Brocklebank, chairman of Cunard, with reference to the controlling interest (reported in *Flight* last week) that his company proposes to take in the Eagle group of companies, was as follows: "We are talking with BOAC about a mutual arrangement . . . The size of our air fleet depends on the talks we are having with BOAC, and whether we get route licences. The main licence we are seeking is for a weekly service from London to Bermuda and back, and the Britannia will be able to do that."

It is significant also that Sir John referred to Cunard's desire "to provide people with the last word in luxury." This can only mean that the Eagle share of the London - Bermuda traffic will not be confined to the low-fare market. The question now is whether Eagle, having made arrangements for the resources and financial backing to satisfy the policy of the Minister, will be granted the London - Bemuda licence for which they applied on October 18, 1957. This application was actually made by the then newly-formed Eagle Airways Bermuda, and it was approved by the Colony on September 15, 1958. The fare was eventually fixed at £124 return—£94 less than the BOAC tourist fare. It was, in fact, a VLF fare. Much to Bermuda's resentment (see pages 147-149 of *Flight* for January 29, 1960) the application has never been approved by HMG.

Will it be approved now? It is possible only to speculate upon the answer; but the significance of the Cunard chairman's remarks is self-evident, and it looks as though he has hopes for something more than a VLF fare.

It is also extremely interesting that Cunard should be talking with BOAC about a "mutual arrangement." Sir Gerard d'Erlanger, chairman of BOAC, confirms that discussions are taking place "to explore possible ways and means in which Cunard and BOAC might collaborate to further British interests across the Atlantic." So here we have (1) Cunard and Eagle working with, rather than against, BOAC; and (2) a tripartite British air corporation-independent-shipping partnership which will obviously be of great advantage to Britain on what is, after all, the world's most important route.

There were informed reports last week that Cunard have financed the purchase by Eagle of three VC10s. This was not confirmed by Cunard or Eagle. But the independent need no longer regard such modern jet re-equipment as beyond its reach. Here it is appropriate to recall the words of Eagle's chairman, Harold Bamberg, to Frank Beswick in *Flight* on February 26: "Our concept is that for long-haul routes a pure jet operation is the cheapest. We expect to reach a definite decision about the type we need within the next two or three weeks." Since then of course Eagle have leased, with an option to purchase, a Britannia 318 from Cubana. Will they now buy Comets?

JAPAN DECIDES ON THE 880

THE culmination of an "extensive study of medium range jet airliners" by Japan Air Lines is a recommendation to the government for the purchase of three Convair 880 22Ms. The cost would be about £1.4m ($3.9m) each.

The study was undertaken by a team led by Tetsuo Oba, JAL's director of operations and maintenance. The first 880 would be delivered in May 1961, and the remaining two in the following month. They would enter service in the early summer of 1961 on the airline's South East Asia network, and on JAL's new southern route to Europe.

Footnote: The 880 22M is the "domestic" variant modified ("M") for shorter ranges. It is the version ordered by Capital, and is powered by straight-jet General Electric CJ-805-3Bs.

AIR SAFETY MUST BE ENFORCED (Continued from page 442)

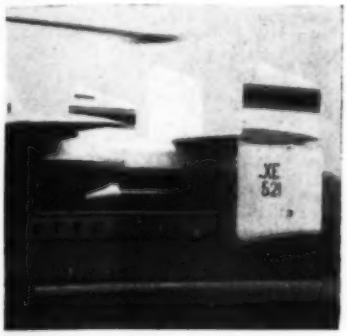
incidents. These are the powers that may need strengthening. This is the staff which may need augmenting. The regulations may require detailed improvement. But there is a very weak case for the creation of an air operator's certificate as a remedy in itself. All the practical and theoretical advantages of certification can be obtained without an actual certificate by making the grant and renewal of the proposed separate air service licence conditional upon the receipt by the ATLB of a satisfactory safety report from the Minister's official charged with aviation safety (at present required only in respect of applicants for scheduled services). Of course, this would mean that there was no right of appeal on safety matters. It is doubtful whether any right of appeal is necessary—any more than one is necessary on the issue of Certificates of Airworthiness or on the grant or withdrawal of ARB approval for a particular inspection organization. The liberty and livelihood of individuals is not directly at stake, and the criteria of air safety should be objective and beyond dispute. No right of appeal is provided in these cases and none seems to be required. The criterion should always be "adequate regulations, wisely enforced."

MR MEKIE AND SIR BRIAN

THE proposed air-rail financial arrangement between Silver City and British Railways will not now take place. It will be recalled that early last January (*Flight*, January 15) news leaked out that Sir Brian Robertson, chairman of the British Transport Commission, had been negotiating with Eoin Mekie, chairman of Silver City, for the purchase of a minority share in the independent airline.

It is not known for what reason the negotiations have broken down, but the grave financial state of British Railways is such that Government approval of an additional capital investment—progressive though this one appeared to be—was never likely to be easily forthcoming. Possibly the Guillebaud Report, which will cost the taxpayer perhaps £40m in higher railwaymen's wages, did not help the rail-air negotiations.

But the breakdown of the negotiations with Silver City does not rule out closer commercial co-operation between the airlines and British Railways. Such co-operation could involve, in addition to Silver City, Air Charter (*Flight*, January 22); and no doubt BEA have not overlooked the possible advantages of co-ordination with the railways.



A third fin has appeared on the prototype Fairey Rotodyne to improve stability at the high speeds now being attained on test flights

ELECTRA PRECAUTIONS

A LIMIT of 275kt (316 m.p.h.) IAS has been imposed by the FAA on all Lockheed Electras in US operation. This is a "precautionary measure" pending completion of investigations into the mid-air disintegration on March 17 of a Northwest Electra. The limit of 275kt IAS applies up to 15,000ft, and is reduced in a prescribed ratio above that height: for example, the limit is 250kt at 20,000ft (Continuous cruising speed of the Lockheed Electra is 352kt (405 m.p.h.) at 22,000ft and 82,500lb. Thus, in practice, the restriction will amount to about 100kt.)

The Northwest accident, says E. R. Quesada, administrator of the FAA, "appears to be sufficiently similar to a previous accident to the same type of aircraft last September near Buffalo, Texas." That accident, involving a Braniff Electra, was also due to apparent disintegration in the air.

A spokesman for the FAA said after a conference with Lockheed officials in Washington last week that there was no need to ground the Electra. After a meeting lasting two hours Mr Quesada said: "The meeting was constructive, helpful and informative, and will assist us materially in developing any appropriate action." A spokesman said that Mr Quesada considered that the speed restriction was a sufficient precautionary measure. An official who attended the meeting is reported to have said that it produced no agreement on what caused the Northwest Electra to disintegrate.

A spokesman for KLM in London last week confirmed that the speed limitation is being applied to their "intercontinental Electras "as a temporary precautionary measure, though we are not bound to do so since our aircraft are of a different type than those involved in the accidents." Their seven aircraft (12 are on order) would continue to fly on time "because of flexible timetables."

BOEING AND THE D.H.121

IN recent weeks representatives of Boeing have been studying the D.H.121 at the de Havilland Company's factory at Hatfield. It is reported also that Convair officials have visited de Havilland to see and discuss the D.H.121. This inevitably renews the speculation that has been rife for some time now as to whether an American manufacturer will—like Douglas have done with Sud Aviation in respect of the Caravelle—collaborate with de Havilland in the development of the D.H.121.

One of the more recent Boeing draft designs for the 727 short-haul jet has been based on a three-engined layout, using Allison-built RB.163s (ARB.963s), and this project has been generally very similar to the D.H.121. Sir Roy Dobson, who as chairman of the Hawker Siddeley Group is now responsible for the ultimate destiny of the D.H.121, has meanwhile referred to a Mk 2 version of the aircraft. This project, which might bear the type-designation D.H.124, is a heavier and more powerful version of the basic short-haul design, with improved payload-range capabilities. The maximum take-off weight would be greater than the 105,000lb of the basic D.H.121, but not as great as the VC11's 170,000lb.

Obviously, Douglas' West Coast competitors—who include Lockheed as well as Boeing and Convair—are anxious not to let the big potential US market for a short-range jet be scooped by the Caravelle; all three companies are known to have projects for a second-generation short-haul jet, and a joint Anglo-American effort is now being seriously talked about on both sides of the Atlantic. One matter which has to be given careful thought is the extent to which the UK is prepared to share with the Americans her automatic landing developments, the incorporation of which in the D.H.121 design from the outset (it cannot easily be retrospectively fitted into a design) is one of the 121's most advanced and competitive features.

Stop Press Four de Havilland engineers have recently returned from a visit to Boeing, Seattle. They are: C. T. Wilkins, chief designer; D. R. Newman, chief technician; John Wimpenny, senior aerodynamicist; and Peter Hall, technical sales manager.

YET MORE CO-OPERATION

FRANCE and Australia, whose new air service agreement was referred to last month, have both recently established a degree of collaboration in equipment between State-owned and privately owned airlines.

The two French independent airlines TAI and UAT are to pool their services to Africa and within the African continent, jointly operating their DC-8s. Air France and UAT are also to integrate regional African services. The suggestion for the pool came from Robert Buron, French transport minister, and is intended to rationalize France's air transport effort within the African continent, to provide technical collaboration on the big jets, and to meet "the needs of politically developing countries."

The UAT-TAI rapprochement will eliminate wasteful competition on the routes between France and points in the French African commonwealth. Meanwhile TAI have at last got traffic right at Sydney on their routes to Noumea in French Caledonia and beyond to the US West Coast, where they will link up with Air France to establish a French round-the-world route.

The Australia agreement is between the State-owned Trans Australia Airlines and the privately owned Ansett-ANA. The latter are to charter three Viscount 700s from TAA and Trans Australia are to charter two DC-6Bs from Ansett. This cross-charter arrangement was recently announced by Athol Townley, Australia's acting Minister for Civil Aviation, who said that it would ensure stability in the airline industry and enable both airlines to accumulate capital reserves necessary for future re-equipment. It would leave Ansett-ANA with an advantage in Lockheed Electras, but to offset this the government had approved the purchase of a third Electra by TAA.

This is how Sud Aviation's Caravelle assembly line at Toulouse appeared towards the end of March. Aircraft for Swissair, SAS, Alitalia and Air France can be seen, and outside on the apron were aircraft for Finnair and Air Algérie

AIR COMMERCE . . .

The Unions and the Bill

THESE comments are by Clive Jenkins, national officer and deputy to the general secretary of the Association of Supervisory Staffs, Executives and Technicians; he is also joint secretary of the supervisory engineering and technical panel of the National Joint Council for Civil Air Transport.

OBVIOUSLY, a trade union officer representing a large group of staff in the civil aviation business will be suspicious of a Conservative Government's motivations in setting up new licensing machinery for the industry. There is a certain subjectivity at work here. Most trade union members in this field work in the two public corporations and are covered by carefully drawn up and often comprehensive agreements. Organization of workers in the independent companies is, generally speaking, at a much lower level. This is partly due to staff turnover but also to the anti-union attitudes of many of the managements. Terms and conditions of service there, particularly pensions, are almost always inferior to those freely negotiated for identical work in BEA or BOAC.

This situation is frequently masked by the payments made for long hours; but, job for job, the independent companies are usually the worse employers. This may be doubted by those who have read the reply to the debate on the Civil Aviation (Licensing Bill) made on March 2 by the Parliamentary Secretary to the Ministry of Aviation. In two passages he explained that negotiated contracts could not be undercut. In the first he said:—

"One of the advantages of tightening up the safety regulations is that we shall ensure that there is no possibility of economizing in that direction. It is also fair to say that there is no possibility of the independents undercutting the corporations . . . by offering less favourable terms and conditions of service."

His second reference was:—

"The Bill leaves quite unaffected Section 15 of the Civil Aviation Act 1949, which provides that the terms and conditions of employment offered by independents, unless they are regulated by another Act, or by an agreement between the independents and the trade unions or in accordance with a National Joint Council agreement, must comply with the following requirements, that is to say, that they shall not be less favourable than the terms and conditions observed by the airways corporations in the case of persons engaged in comparable work."

This sounds like an effective assurance. In reality it is not. The Parliamentary Secretary seems unaware that, following the case [of a particular independent] which I took before the Industrial Court nearly ten years ago, almost every independent company split itself into two separate corporate parts. One part flies the aircraft, the other performs the ground functions. But, as the ground services company does not take powers in its articles of association to operate aircraft for hire or reward, it is legally held not to be "constituted" for that purpose. Therefore, Section 15 of the 1949 Act simply does not apply.

By this legal evasion the independents protect themselves from paying the negotiated rate for the job. This weakness in the Act *does* enable independent companies to undercut the corporations.

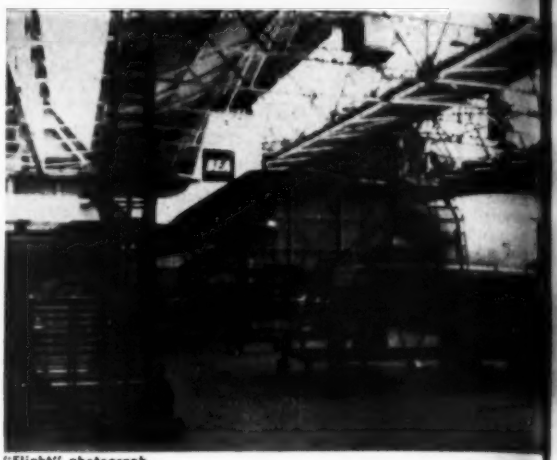
But, having made this point, I want to extend a highly qualified welcome to the new proposals. They obviously have some merits over the ATAC arrangements. Not the least is Section 2, which requires the board when hearing applications to "consider in particular" certain desiderata which include that in sub-para (e):—

"Any capital expenditure reasonably incurred, or any financial commitment or commercial agreement reasonably entered into, in connection with the operation of aircraft on air transport services by any person (including the applicant) who is the holder of any air service licence already granted."

This is a new requirement and is obviously of great importance to the corporations, who have been the objects of a great deal of State support and investment which have, in turn, buttressed the aircraft industry as a whole. It is also reassuring to see so much responsibility retained by a Minister who, one might gather from his speeches, adheres to the policy of the "chosen instruments." It is to be hoped that any competitive activity that results will not be restricted by artificial curbs on the natural expansion of BEA and BOAC, or that there will be any specially protective allocation of traffic or mails to private-enterprise operators who otherwise would not survive.

My own view is that, in a murderously competitive world, the State corporations should have restored to them a monopoly of scheduled services. Side by side with this should go a requirement that persons working on or around aircraft flying for hire and reward should be paid not worse than those in the publicly-owned sector performing similar tasks. No doubt the political situation is unsympathetic to this attitude, which will have to be pressed on a future administration.

In the meantime, I confess on a first examination that Mr Sandys' Bill could have been worse. But then, on the other hand, perhaps it will be.



"Flight" photograph

The first D.H.121 for BEA and the last Comet 4B for BEA—representing two generations of de Havilland jet airliner design—are seen together in the manufacturer's assembly hall at Hatfield

BREVITIES

It is reported that the USSR has offered Il-18s to India at a price of about Rs9m (about £675,000) each.

Air Liban, reports a Middle East source, is likely to purchase three Caravelles.

On March 23 an L.1049H Super Constellation of Lufthansa uplifted at London Airport for Malta a ship's propeller shaft weighing 27,400lb.

DTA of Angola and DETA of Portuguese East Africa are expected to sign for three Fokker Friendships in Lisbon in the near future.

May 31 is the date on which Blackbushe Airport will be finally closed. From today, April 1, the airport is closed from 0001 to 0800hr.

It is reported that United Air Lines and Sud Aviation have formed a joint company to sell 15 of United's DC-6s and DC-7s.

The Comet 4 simulator for Aerolineas Argentinas left the Aylesbury factory of General Precision Systems for Argentina on March 26.

A sum of £110,000 is provided for in the 1960-61 Civil Aviation Estimates as a contribution to the new College of Air Training.

No. 100 Boeing 707 was delivered on March 18. The aircraft was a 707-420 for Air France. A total of 210 Boeing jet airliners have been ordered.

Douglas announce that the DC-8 series 40 (the intercontinental model with Rolls-Royce Conways) was granted its FAA type certificate on March 23. Delivery has already been made to TCA.

Euravia, according to a Netherlands source, will pay about £59,000 each for the three Convair 340s traded in by PIA as part of their contract for three Fokker Friendships.

The Russian journal *Soviet Aviation* has announced a new plan by which passengers in transit through the USSR will no longer need visas and can stop-over for 24 hours without visas. This scheme was introduced about a month ago.

The extension to Prestwick's main runway was completed on March 23. It is now 9,800ft long. Completion of lighting and taxi strips will enable TCA to fly London - Toronto DC-8s via Prestwick early in June, followed by BOAC later in that month.

May 6 is the date agreed by the transport ministers of the Air Union nations (France, Germany, Italy and Belgium) for a meeting in Rome to settle the legal, financial and technical points which remain to be agreed before the Air Union can be inaugurated.

The FAA is proposing to require crack-inspection of the main undercarriage cross-shaft bearing channels on US Viscount 745Ds and 810s. A visual inspection would be required every 4,000 or more flights at intervals of not more than 160hr. Installation of reinforced inboard and outboard bearing channels would be required not later than April 1, 1961.

The commander of the BOAC Comet 4 which landed with its wheels up at Rome last December, Captain W. G. Wallace, has been demoted to first officer. The co-pilot on the flight, F/O D. G. Thornton, has been reprimanded with loss of seniority. No one was injured in the incident, and the aircraft was repaired on the spot and was back in service by February.

For the ninth successive year TCA made a profit in 1959—$152,554 on a revenue of nearly $135m. Average passenger load-factor was 66.5 per cent. The airline is trying to sell its surplus fleet of DC-4Ms as a package deal complete with powerplant-overhaul shop, simulator and spares, for delivery from September 15, when phasing-in of Vanguards will begin.

The FAA has formed a committee to make recommendations on the problem of slush-covered runways. Data will be supplied by the NASA, whose recent experiments at Langley Field may form the basis of the committee's recommendations. It is said that Boeing have found that 707 take-offs are lengthened by 10 per cent in half-an-inch of slush, and United has written an arbitrary off-load of 12,000lb into its [DC-8] flight manual for the same slush depth.

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